MINISTRY OF EDUCATION, YOUTH & INFORMATION

Centre of Occupational Studies
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THE CENTRE OF OCCUPATIONAL STUDIES

CURRICULUM

OCCUPATIONAL ASSOCIATE DEGREE
in
RENEWABLE ENERGY TECHNOLOGY

Developed By

THE CENTRE OF OCCUPATIONAL STUDIES
MINISTRY OF EDUCATION, YOUTH and INFORMATION
JAMAICA

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COS 2017

INTRODUCTION

Aligned with the goals of the National Development Plan for Jamaica, is the thrust for educational development through opportunities of higher learning and professional development. One element of this thrust is the development and implementation of Occupational Programmes of Study. Occupational Certification is designed to bridge the gap between traditional and TVET education at the tertiary level.

Occupational Studies involves the training and assessment to support the development of competence in specific skills/occupations, designed to prepare individuals for employment. Occupational programmes are defined by the methodologies of Competency Based Education and Training (CBET), and the Technical Vocational Education Training (TVET) strategies for the development of competent workforces. A critical operational principle of the CBET Policy is that the development of Training, Assessment and Certification Programmes must be designed upon the occupational competencies of the workplace that is the needs, demands and requirements of employment.

The term **curriculum** refers to the lessons and academic content taught in a school or in a specific course or program. The design and development of this Occupational Associate Degree curriculum has incorporated the CBET Principles, the National Vocational Qualification of Jamaica, benchmarked against other international standards and similarly recognized international programmes of like nature. It is also reflective of the Educational, TVET, Social, Cultural and Economic goals of the Vision 2030 Development Plan for Jamaica.

The Occupational Degree Curriculum is designed to aid the professional and competency based pathway for persons to develop occupational competencies across the specific skill areas at various levels, with an emphasis on academic and personal cognitive development. This parallel pathway will allow persons to have comparable credentials of recognition to those of their counterpart perusing academic studies.

OCCUPATIONAL RATIONALE

A country's global competitiveness is a function of the quality of its workforce and therefore, a skilled workforce is essential for sustainable, and balanced growth. The Planning Institute of Jamaica, in the 2012 survey of living conditions, reported that the age 14 and over population without certification at any level was 69.6 per cent. Some 90.7 per cent of the poorest in the population had no certification while among the wealthiest, the figure was 53.5 per cent. Non-certification among the Prime Working Age (25 – 29) was at 70.1 percent, males with no certification was 77.1 percent, and females were 64.0 percent. In the Kingston Metropolitan Area, the number of people without formal certification was 39.4 percent. Clearly, there is the need for relevant and accessible educational training opportunities that are designed to create a globally competitive workforce. The industry through a needs analysis, also clearly identified and defined the need for a workforce complimented by qualified employees with applied knowledge and skills in selected areas of study; to provide effective and efficient supervisory and leadership competencies.

The development of occupational certification is further rationaled by the obvious necessity to align higher education with the emerging needs of workplace and industry as well as the growing relevance of occupational certification internationally.

Philosophical Principles

Programmes in Occupational Studies will be developed against the philosophical principles that,

- Professional knowledge is what a learner should know and understand regarding the subject.
- Professional skills are what a learner should be able to do.
- Core skills refer to basic skills involving dexterity and use of methods, materials, tools and instruments used to perform the job including Information Technology skills needed for that job.
- Responsibility aspect determines the
    - Nature of working relationship,
    - Level of responsibility for self and others
    - Managing change and
    - Accountability for actions.

CONTENTS

17. Using AutoCAD Applications and Design (Drafting II)		
18. Designing and Installing Renewable Energy Systems I		
19. Appling Energy Systems Controls		
20. Estimating and Costing Work Activities		
21. Auditing Renewable Energy Systems		
22. Applying Legal and Regulatory Requirements		
23. Using Electrical Power Distribution Systems		
24. Developing Entrepreneurship Strategies		
25. Designing and Installing of Renewable Energy Systems II		
26. Managing Renewable Energy Projects		
27. Supervising Renewable Energy Operations		
28. Purchasing and Inventory Control		
29. Using Employability Skills		
30. Major Capstone Project		
31. Acquiring Professional and Industry Recognitions		
32. Externship Industry Attachment (Summer) - 240 hours		

Acknowledgement

The Centre of Occupational Studies acknowledges the professional and intellectual contribution of the institutions and organisations which served in the development of the Occupational Associate Degree in Renewable Energy Technology.

This Curriculum being designed on workplace competencies and recognized Occupational Standards, required the input and validation of trainers, lecturers, instructors, industry professionals and learning resource developers.

Paramount to the development of this curriculum was the collaborative efforts of representatives from the below entities. It is therefore with respect and regard for competent learning and quality service that the Centre of Occupational Studies acknowledges:

- HEART –Trust/NTA
- Excelsior Community College

Matriculation Requirements

For matriculation or entry into the Occupational Associate Degree programme applicants must meet/possess at least one of the below requirements:

- Career Advancement Programme (CAP) NVQ/CVQ, Minimum Level 2 Certification
- HEART Trust/NTA, NVQ – Minimum Level 2 Certification
- Other entry requirements – in accordance with the respective COS Institution minimum entry requirements.
- Mature Entry

  Applicants with relevant experience of service in the sector may seek to pursue this programme. The mature entry status should be further specified and confirmed in accordance with the relevant policies and procedures established at the institution hosting this programme. Applicants who qualify under this category must pass a college readiness test of English and Mathematics and are required to submit a professional portfolio which will be used to determine eligibility. Mature entrants may be required to complete bridging

courses prior to enrollment into this programme being guided by the institutional policies and procedures specific to same.

Entry Test

All applicants requesting enrollment into this programme MUST sit the COS recommended entry test (ASSET Test).

Entry Points

- Entry at the start of the programme: Candidates can enter this OAD Programme at the commencement, year 1 semester 1.
- Entry at the start of the year two: Candidates can enter this OAD programme at the commencement of year 2 semester 1, provided the candidate satisfies the minimum proficiency rating of the demonstrated occupational outcomes of all prerequisite and prior sequenced courses in the year 1.

Exemptions

Prior Learning Assessment/Advanced placement may be sought by trainees who have successfully completed courses taken through a recognized technical vocational institution or recognized certifying body. Trainees may apply for credit transfer in accordance with the Transfer Policies and Procedures of the institution offering this programme, in consultation with the COS. Successful applicants will receive exemptions from eligible units of competency once requirements for obtaining credit transfer are satisfied.

Design Format

This Curriculum is packaged in discrete Courses of Employable Skills which can be independently delivered and assessed; however, there are courses which are competency builders for others. These courses, although independently teachable and assessable, may be prerequisite courses and should be attained by the student prior to commencement of the respective course to be pursued.

Programme Structure

The Occupational Associate Degree Programme is structured to be delivered over 4/5 semesters. The programme should be completed within the limits as stated below:

- By full-time study the programme is normally two years. The time limit to complete the programme must not exceed three years.
- By part-time study, the programme is expected to be completed within three years, but must not exceed four years.

The programmes are structured to provide a mixture of:

- general education courses
- support courses
- specialized courses
- industry experience

The Programme Structure consists of a number of Courses. The following are the components of each course:

1. Course Parameters

The parameters detail the name of the *faculty*, the *programme name*, the *course name*, the *course code,* the *credit hours*, the *credit value*, *semester and year*, *prerequisite course*; and the *approving authority*.

2. Learning Outcomes and Instructional Objectives

The set the boundaries for the learners' attainment, as well, as that for the instructors'/lecturers' delivery of content.

3. Units

The Units are the building blocks for the course; they have *Specific Objectives,* which form the instructional strategies for the delivery of the unit and the basis for the development of assessment strategies and project assignments. The course content is each Unit. It sets the range and depth of knowledge, skills and attitudes to be covered by each instructor/lecturer. It serves to standardize the instructors/lecturers.

4. Credit Hours & Credit Value

Credit Hours is the time suggested for the duration of the delivery time. Credit Value is the credit requirements aligned with the credit hours, for certification or the granting of the Award. The theory courses are calculated as 15 hours per credit with a minimum of 45 hours of instruction and practical courses are calculated at 45 hours per credit with a maximum of 4-6 credits per course.

5. Capstone Experience

The Capstone Experience outlines industry specific tasks/assignments the students will undertake to consolidate their learning by incorporating the competencies gained. Students' capstone experience is represented in a project, undertaken after successful completing and acquiring the requisite competencies of all courses in the programme.

6. Resources

The resources required to support the attainment of the learning and instructional objectives are indicated, these often include: human resources, materials, text, etc.

7. Industry Experience – Internship/Externship

The Associate Degree programmes include a work experience component which allows students to gain practical skills and observe and apply management principles and theories. Students pursuing an this degree are required to complete 240 hours of Industry Experience. Exemptions may be granted at the discretion of the institution.

8. Methodology

The methods of delivery are the suggested instructional strategies use in the delivery of the specific programme. **These learning strategies are intended to encourage, in each student, the following competencies; the ability to:**

- manage resources within defined areas of work
- make independent choices and solve routine problems independently
- transfer and apply theoretical concepts and technical skills to a range of contexts
- judge the reliability and validity of different sources of information
- manage, under guidance, ethical and professional issues in accordance with current professional and/or ethical codes or practices

- understand the importance of Standard English in written, spoken or visual messages in the field of Renewable Energy
- understand the value of life-long learning to a professional in the field of Renewable Energy
- demonstrate awareness of own and others' roles, responsibilities and contributions when carrying out and evaluating tasks
- demonstrate tolerance and temperance when interacting with others.
- develop the performance of the requisite technical competencies relevant to the unit and the course of study
- increase the independence of the learner
- create critical thinkers
- equip learners to enter the corporate world

A variety of strategies will be used to facilitate student learning and competency development. The list includes, but is not limited to, combinations of the following:

- Interactive lectures
- guest lectures
- group discussions/ Think-pair-share
- case studies
- audio visual presentations
- independent study
- individual/group research/projects
- individual/group presentations
- laboratory work
- practical demonstrations
- problem solving
- site visits (including virtual visits)
- seminars/workshops
- blended delivery to include the use of the Internet/Intranet

9. Occupational Assessment (OA) & Evaluation

The curriculum is designed to accommodate occupational assessment and evaluation, similar to that of competency based assessment. This is where student learning, competency development and

demonstrated performance is assessed on an on-going basis in alignment with the specific learning outcomes for each course. This approach allows for corrective development and learning.

All assessment is designed to measure the level of mastery a student has achieved of the competencies stated in the course syllabus. Student competencies are displayed, as much as possible, in a real or simulated workplace environment. Where it is not possible for this to be done, students are presented with an opportunity to display competencies in a context that is familiar to them.

Assessment instruments are designed to produce valid and reliable grades that are used to inform planning, and competencies are measured in contexts which are student-centered, and provide opportunity for verification of the authenticity of students' work.

Occupational Assessment for this programme will outline in each course outline:

- the suggested unit/ cluster-of-units to be assessed, (for example, UNIT I, II and III)
- the suggested strategy/type(s) of Occupational Assessment (OA), (example, OA – Group research paper and presentation)
- the percentage weight which each grade will represent in the final grading for rating, (for example, 20%)

An occupational assessment/evaluation can be a combination of any of the following.

- Tests/written paper
- Laboratory activities
- Practical demonstrations (in-class, field)
- Projects (individual or group)
- Oral reports and presentations (in-class)
- Graphical displays
- Self and peer evaluations

In applying an on-going assessment approach, the view of final examination will must not be observed, instead assessment which is scheduled at the end of the semester will cover the remaining units to be to be assessed. The facilitating team within the institution has the liberty to determine to,

should the need be observed, minimally include previously assessed units based on an alignment with the main units to be assessed.

The end of semester assessment will be any of or a combination of any of the following:

- Multiple Choice Questions (MCQs) & Structure Questions (SQs)
- Practical Assignments (PAs)

Portfolio of Assessment

A Portfolio of Occupational Assessment will be developed by each student on a per semester basis. The portfolio is intended to capture for external verification purposes, evidences of occupational assessment activities and related outcomes. The institution is required to provide mentoring to students in the development of individual portfolios.

Feedback

Students will be given analytic rubric within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be documented on assessment evidence/instrument.

10. Proficiency Rating/Grading Scheme

A student's ***final grade*** which determines the ***competency rating*** is calculated by the combination of the on-going assessment grades. *See the Grading Scheme below.*

11. Recommendations to Programme Administrators/Lecturers

This Occupational Associate Degree is designed on the CBET Principles to reflect the requirements of industry, as well as, that of the learning institution. It is therefore important that individuals responsible for programme administration, programme delivery and the management of the assessment and certification processes exercises due process to actualize the principles of Competency Based Education and Training (CBET) in the Teaching and Learning experiences. It is being recommended that Experiential Learning Strategies be a critical feature of the process. The Assessment Processes employs Authentic and Fair Assessment Strategies to confirm students' competencies. Assessment should not only be for the confirmation of competence but also be used as a catalyst for improving the instructional process and students' achievements.

Awarding of Degree

Upon completion of the below, participants who have pursued the Renewable Energy Technology programme with be awarded an ***Occupational Associate Degree in Renewable Energy Technology.***

Participants must have:

1. completed all courses as specified by the programme
2. completed two hundred and forty (240) hours of Work Experience
3. met all other requirements as outlined by individual institutions and the *Centre of Occupational Studies within the Ministry of Education Youth and Information.*

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COS PROFICIENCY RATING GRID

Mark Range (where applicable)	Grade Point Average (GPA)	Letter Grade	Description
90 – 100%	4.00	A	**High Competence:** where the student has demonstrated highly original, relevant and sophisticated applications of research, appraisal, enquiry and evaluation techniques resulting in innovative concepts that challenge existing conventions In the field of study.
85 – 89%	3.70	A-	**Competence with Distinction:** where the student has demonstrated a high level of performance indicating depth and breadth in research, appraisal, enquiry and evaluation with broad application of knowledge of theoretical concepts, and applied analytical thought.
80 – 84%	3.30	B	**Competence with Credit: where the student has untaken an innovative and creative interpretation of assessment briefs, and has provided evidence of extended research and inquiry applied to assessments tasks.**
75 – 79%	3.00		
70-74	2.70	B-	**Competent:** where student has met all requirements of assessment tasks to a satisfactory level.
65-69	2.30	C	
60-65	2.00		
55-59	1.70	C-	
50-54	1.30		
Under 50 (45-49)	1.00	D	**NYC: where the student has not demonstrated satisfactory performance in assessment tasks or has not met subject requirements.**
Under 45	1.00	E	
NYC of a 'must pass event'			**Not Yet Competent:** where the student has an overall mark for the subject at a passing level, but has not demonstrated satisfactory performance to be deemed competent.

Withdrawn no penalty:

a) Where the student has withdrawn from the subject on or before the census date
b) Where the student has withdrawn from subject after consultation, without penalty
c) Where the student has withdrawn from the subject due to serious illness or misadventure

Deferred result: Where, for approved reasons, health or misadventure, a student is allowed to resubmit an assessment or sit an exam at a later date.

PROFILE
OCCUPATIONAL ASSOCIATE DEGREE
RENEWABLE ENERGY TECHNOLOGY

Programme Rationale

As the renewable energy revolution spreads worldwide, Jamaica is no exception in the increase in renewable energy activities, through projects, entrepreneurial pursuits, plants/farms and training programmes. Reports from Research conducted by the Labour Market Research and Intelligence Department (LMRID) of the HEART Trust/NTA has indicated that Solar Energy Technicians will be in increased demand between 2015 and 2017 and Solar Panel Installers and Energy Auditors will be in demand by 2017/2018. Additionally, more recent reports has shown the continued interest and growth of renewable energy in the world – hugely influenced by the increase in oil/fuel cost.

Residential and commercial consumers are increasingly investing in renewable energy systems to meet their energy needs. Energy auditing plays an important role in maximizing energy conservation and savings. The installation of a renewable energy system in a facility/system that is energy inefficient without addressing the inefficiency reduces the effectiveness of the installation. For these reasons, there is an increase in the demand for persons who are trained and certified to audit, design, install and repair renewable energy systems as well as supervise completion of these activities.

Additionally, energy experts indicate a shortage of Systems Designers, Project Managers, Energy Auditors and Procurement Specialists, among others, and a need for certified and accredited Installers, all of which are medium to high skilled occupations. Given the national imperative toward sustainable growth and development and findings of labour market research, there is an apparent need for training and certification in renewable energy at the degree level.

The programme will help to satisfy the recognized need for training and certification of persons in this occupation at this level and will support Jamaica's commitment to diversifying energy sources and providing cost-effective, environmentally sustainable and efficient energy solutions.

Programme Description

The Occupational Associate Degree Programme in Renewable Energy Technology is an Applied Associate Degree which is designed on workplace competencies. It is developed for persons who are

desirous of developing the knowledge, skills and attitudes necessary to become well-rounded in the auditing, design, installation, diagnosis, repair and maintenance of renewable energy systems and supervision of work teams.

As an occupational programme the development of competencies in agricultural production and supervision are enabled through the integration of academia and technical/vocational training relevant to the occupational programme. The duration of study is projected for two years across four administrative semesters and a summer internship/externship (work attachment component) component. The programme design combines related underpinning academic competencies with the practical occupational competencies. The programme allows for a "work-ready" and "employable" graduate who can contribute to and create/add value to their place of employment, the industry and the nation. The development of these competencies are complimented by the professional development courses in in this programme; aimed at developing an occupational and workplace competent individual, through application of critical employability skills; science, technology, engineering, arts and mathematics (STEAM) skills and a general awareness of, sensitivity to and appreciation for human diversity. As such, the programme takes a learner-centred approach to instruction and considers the varied needs of students in the use of instructional and assessment strategies.

The programme is also designed at a level where graduates can not only earn an institutional certification, but in addition, professional and or industry recognitions including license required for professional practice.

At the end of the programme, students who are deemed competent in the specific requirements for this programme/successful will be awarded an **Occupational Associate Degree in Renewable Energy Technology.**

Programme Goals

The Renewable Energy Technology Programme addresses the growing need for competencies related to the occupational discipline. The programme seeks to produce rounder graduates who will exhibit the abilities and competencies to function as junior supervisors with the capacity to grow and develop in the industry and continue on to higher levels of education.

Upon completion of this programme graduates should be able to:

- Analyze D.C. & A.C. electrical circuits
- Apply the principles of HVAC and used the related applications
- Apply renewable energy principles and practices
- Communicate effectively in the workplace
- Utilize computer applications to support work activities
- Solve renewable energy related mathematical calculations
- Provide quality customer service
- Prepare workplace documentations and technical reports
- Apply the principals of thermodynamics
- Prepare renewable energy related drawings
- Work with electronic devices and renewable energy systems
- Utilize the applications and design of AutoCAD
- Design and install renewable energy systems
- Apply energy systems controls
- Estimate and cost work activities
- Audit renewable energy systems
- Applying legal and regulatory requirements to renewable energy engagements.
- Use Electrical Power Distribution Systems
- Apply entrepreneurship strategies to business development
- Supervise renewable energy operations and projects
- Effectively apply the principles of inventory control

PROGRAMME STRUCTURE AND SEMESTERISATION

Foundation General Education Courses: Critical to the delivery of this Occupational Degree Programme is the inclusion of general foundation courses, in the following subject areas: **Mathematics, Communication and Computer Application.** These courses will be timetabled and included in the training and delivery programme by the institution.

Year 1 - Semester 1

Course Code	Course	Credit Value	Credit Hours
COSEDCC1101	Analysing D.C. Electrical Circuits	3	45
COSEHVC1101	Using HVAC Fundamental Principles	3	45
COSEREN1101	Applying Renewable Energy Principles and Practices (Renewable Energy I)	3	45
COSEACM1101	Communicating Effectively in the Workplace	3	45
COSECAP1101	Using Computer Applications	3	45
COSETMA1101	Performing Engineering Mathematics Calculations I	3	45
Total	**6**	**18**	**270**

Year 1 – Semester 2

Course Code	Course	Credit Value	Credit Hours
COSEPCC1102	Providing Customer Service I	3	45
COSETMA1201	Performing Engineering Mathematics Calculations II	3	45
COSEACC1101	Analysing A.C. Electrical Circuits	3	45
COSEACM1201	Preparing Workplace Documentations and Technical Reports (Applied Communication II)	3	45

COSEHVC1201	Using HVAC Applications I	3	45
COSEATD1101	Applying Thermodynamics	3	45
COSEDFT1101	Preparing Drawings (Drafting Designs I)	1	45
	* Internship/Externship (Workplace Attachment)	6	240
Total	**8**	**25**	**555**

Year 2 – Semester 3

Course Code	Course	Credit Value	Credit Hours
COSEHVC2301	Using HVAC Applications II	3	45
COSEREN2201	Working with Electronic Devices and Renewable Energy Systems	3	45
COSEDFT2201	Using AutoCAD Applications and Design (Drafting II)	1	45
COSERES2301	Designing and Installing Renewable Energy Systems I	3	45
COSEESC2101	Appling Energy Systems Controls	3	45
COSEEC2301	Estimating and Costing Work Activities	1	15
COSEENA2101	Auditing Renewable Energy Systems	3	45
COSEAPL2301	Applying Legal and Regulatory Requirements	3	45
Total	**8**	**20**	**360**

Year 2 – Semester 4

Course Code	Course	Credit Value	Credit Hours
COSEEPD2101	Using Electrical Power Distribution Systems	3	45
COSEDED2401	Developing Entrepreneurship Strategies	3	45
COSERES2401	Designing and Installing of Renewable Energy Systems II	3	45

COSEPMG2101	Managing Renewable Energy Projects	3	45
COSESREC2401	Supervising Renewable Energy Operations	3	45
COSESPC2401	Purchasing and Inventory Control	3	45
COSEES2401	Using Employability Skills	3	45
COSEMCP 2401	* Major Capstone Project	1	45
COSAPIR 2401	Acquiring Professional and Industry Recognitions	1	45
Total	**9**	**23**	**405**

Course Codes: Note that all programme and course codes are under official review. Final approved programme and course codes will be communicated through a revision and promulgation of this document.

COURSE OUTLINES

YEAR 1

SEMESTER 1

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	ANALYSING D.C. ELECTRICAL CIRCUITS
COURSE CODE:	COSEDCC1101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 1, SEMESTER 1
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to handle D.C. circuits, detect faults, wire circuits, read diagrams associated with the circuit designs, carry out safety procedures in using circuits and interpret regulations pertaining to the operations of circuits.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students should be able to apply the principles and practices of Direct Current (D.C.) to work with electrical circuits.

Upon completion of this unit, students are competent when they are able to:

1. Comply with relevant regulations and codes of practices
2. Comply with OHS and other safety requirements
3. Describe appropriate selection, preparation and use of materials, tools, equipment and testing devices
4. Pay attention to detail when identifying, analysing and solving problems
5. Follow procedures in finding faults and executing repair activities

UNIT I – APPLY SAFETY AND RELATED REGULATIONS 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1. Interpret relevant regulations, codes of practice and OHS requirements

1.2. Comply with relevant regulations, codes of practice and OHS requirements

1.3. Explain codes of practice that govern D. C. circuits operations

1.4. Identify relevant risks and hazards

1.5. Manage risks and hazards according to policies and procedures

1.6. Follow safety procedures and OHS regulations

1.7. Report accidents and incidents according to policies and procedures

1.8. Carry out safety check audits

Content

To include but not limited to:

- Occupational Health and Safety procedure
  - Relevant regulations and codes of practice requirements in OHS requirements
  - Types of hazards associated with working in D.C. circuits
  - Types of risks and risk management policies and procedures
- Types and causes of faults in single source, parallel and series-parallel D.C. circuits (current, voltage, resistance, power)

UNIT II - WORK WITH D.C. CIRCUITS 15 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1. Explain the basic principles and rules of direct current electricity

2.2. Explain types, components and functions of direct current electrical circuits

2.3. Calculate direct current quantities using Ohm's Law

2.4. Outline characteristics and basic rules for D.C. series and parallel circuits

2.5. Describe situations where direct currents are applicable

2.6. Build direct current series, parallel and series-parallel circuits

2.7. Interpret circuit symbols and notations

2.8. Interpret circuit decisions and layout

Content

To include but not limited to:

- Direct current electrical circuit:
  - Symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram
  - Purpose of each component in the circuit
  - Causes and effects of an open-circuit, a closed-circuit and a short-circuit
  - Multiple and sub-multiple circuits
- Ohm's Law Application in Direct Current circuits:
  - Types of direct current circuits and notations used for circuit diagrams
  - Basic D.C. single path circuit
  - Voltage and currents levels in a basic D.C. single path circuit
  - Effects of an open-circuit, a closed-circuit and a short-circuit on a basic D.C. single path
  - Relationship between voltage and current from measured values in a simple circuit
  - Determining voltage, current and resistance in a circuit given any two of these quantities:
  - Graphical relationships of voltage, current and resistance
  - Relationship between voltage, current and resistance
- Series circuits:
  - Circuit diagram of a single-source D.C. series circuit
  - Identification of the major components of a series circuit: power supply, loads, connecting leads and switch
  - Applications where series circuits are used in the Electro technology industry
  - Characteristics of a series circuit - connection of loads, current path, voltage drops, power dissipation and effects of an open circuit in a series" circuit
  - The voltage, current, resistances or power dissipated from measured or given values of any two of these quantities
  - Relationship between voltage drops and resistance in a simple voltage divider network
  - Setting up and connecting a single-source series D.C. circuit
  - Measurement of resistance, voltage and current values in a single source series circuit
  - Effect of an open-circuit on a series connected circuit
- Parallel circuits:
  - Schematic diagram of a single-source D.C. parallel circuit
  - Major components of a parallel circuit (power supply, loads, connecting leads and switch)
  - Applications where parallel circuits are used in the Electro technology industry

- Characteristics of a parallel circuit (load connection, current paths, voltage drops, power dissipation and effects of an open circuit in a parallel circuit)
- Relationship between currents entering a junction and currents leaving a junction
- Relationship between branch currents and resistances in a two branch current divider network
- Calculation of the total resistance of a parallel circuit
- Calculation of the total current of a parallel circuit
- Calculation of the total voltage and the individual voltage drops of a parallel circuit
- Setting up and connecting a single-source D.C. parallel circuit
- Resistance, voltage and current measurements in a single-source parallel circuit
- Voltage, current, resistance or power dissipated from measured values of any of these quantities
- Output current and voltage levels of connecting cells in parallel

UNIT III - COMPONENTS OF DIRECT CURRENT CIRCUITS 12 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1. Identify components of direct current circuits

3.2. Explain the function of direct current circuits

3.3. Comply with codes of practice and OHS requirements when working with components

3.4. Explain the effects of components in types of direct current circuits

3.5. Detect faulty components

3.6. Test components for functionality

Content

To include but not limited to:

- Capacitors in Series and Parallel Modes:
  - Hazards involved in working with capacitance effects and the safety control measures that should be taken
  - Safe handling and the correct methods of discharging various size capacitors
  - Dangers of a charged capacitor and the consequences of discharging a capacitor through a person
  - Factors which determine the capacitance of a capacitor and explain how these factors are present in all circuits to some extent
  - Effects of capacitors connected in parallel by calculating their equivalent capacitance

- Effects on the total capacitance of capacitors connected in series by calculating their equivalent capacitance
- Connecting capacitors in series and/or parallel configurations to achieve various capacitance values
- Common faults in capacitors
- Testing of capacitors to determine serviceability
- Application of capacitors in the Electro technology industry
- Control devices – switches, fuses, breakers, capacitors – types, rating capacity
- Lighting devices
- Wires – types and sizes
- Methods of securing components to surface
- Wiring methods

UNIT IV - USE MEASURING DEVICES 15 HOUR

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1. Explain the principles of operation for types of direct current measuring devices
4.2. Identify types of measuring devices
4.3. Follow safety procedures in using measuring devices
4.4. Select correct device for measuring specific electrical quantity
4.5. Follow procedures for care and maintenance of measuring devices
4.6. Follow procedures for storage/security of devices
4.7. Read and record readings from devices
4.8. Use measuring devices in accordance with codes of practice and OHS requirements
4.9. Select an appropriate meter for measuring electrical quantities

Content

Include but not limited to:

- Selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application
- Measuring resistance using direct, volt-ammeter and bridge methods

- Instruments used in the field to measure voltage, current, resistance and insulation resistance and the typical circumstances in which they are used
- Hazards involved in using electrical instruments and the safety control measures that should be taken
- Operating characteristics of analogue and digital meters
- Correct techniques to read the scale of an analogue meters and how to reduce the parallax error
- Types of voltmeters used in the Electro technology industry – bench type, clamp meter, multimeter, etc.
- Purpose and characteristics (internal resistance, range, loading effect and accuracy) of a voltmeter
- Types of voltage indicator testers e.g. LED, neon, solenoid, volt-stick, series tester, etc. ; explain the purpose of each voltage indicator tester
- Operation of various voltage indicator testers
- Advantages and disadvantages of each voltage indicator tester
- Various types of ammeters used in the Electro technology industry – bench, clamp meter, multimeter, etc.
- Purpose of an ammeter and the correct connection (series) of an ammeter into a circuit
- Reasons why the internal resistance of an ammeter must be extremely low and the dangers and consequences of connecting an ammeter in parallel and/or wrong polarity
- Selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application
- Connecting an analogue/digital voltmeter into a circuit ensuring the polarities are correct and take various voltage readings
    - Loading effect of various voltmeters when measuring voltage across various loads
    - Using voltage indicator testers to detect the presence of various voltage levels
    - Connecting analogue/digital ammeter into a circuit ensuring the polarities are correct and take various current readings

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Feedback will be in accordance with institutional policies.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, small group activities, practical demonstrations, case studies, online activities, research presentations

CAPSTONE EXPERIENCE DESCRIPTION

Students will be required to

- calibrate instruments
- record readings of quantities in direct current circuits
- test capacitors
- build series, parallel and series-parallel direct current circuits

RESOURCES

Required Text

1. Suggested: Goodstal, G. (2013). Electrical theory for renewable energy. Clifton Park, NY: Delmar
2. Human Resources: Lecturers, Circuit material, measuring devices

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	USING HVAC FUNDAMENTAL PRINCIPLES
COURSE CODE:	COSEHVC1101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 1, SEMESTER 1
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to handle HVAC components, detect faults, carry out repairs and deal with refrigeration systems, ductwork, air properties, heat systems and airflow systems.

LEARNER OUTCOMES/INSTRUCTIONAL OBJECTIVE

Upon completion of this unit, students are competent when they are able to:

1. Interpret relevant regulations, codes of practice and OHS requirements
2. Comply with relevant regulations, codes of practice and OHS requirements
3. Explain the properties of air and its relationship to the transfer of energy in a facility
4. Apply the theory of basic heat transfer and its application to heat gain/loss calculations and also to fluid flow in hydronic systems
5. Apply the theory of air movement to and its application to the assessment of ventilation principles in a facility

6. Select appropriate duct and grilles for HVAC requirements
7. Explain the fundamentals of refrigeration and its relationship to air conditioning and heat pump systems
8. Analyse methods and strategies for resolving energy usage and developing energy efficiency in HVAC systems

UNIT I – ANALYZE AIR PROPERTIES 10 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1. Comply with relevant regulations, codes of practice and OHS requirements
1.2. Differentiate types of HVAC systems
1.3. Explain the properties of air as it relates to the transfer of energy in a facility
1.4. Explain the principles of psychometrics
1.5. Explain methods of energy transfer
1.6. Check air quality
1.7. Measure psychometric variables

Content

To include but not limited to:

- OHS regulations
- HVAC Systems (types, functions, components, advantages, disadvantages)
  - Properties of air:
  - Key terms and concepts: humidity ratio, specific humidity, absolute humidity, density, relative humidity, degree of saturation, specific volume, dry-bulb temperature, wet-bulb temperature, wet-bulb temperature depression, dew-point temperature
  - Properties of air and water vapour mixture
- Principles of psychometrics:
  - Psychometrics processes
  - Psychometric charts
  - Methods of measuring psychometric variables
  - Dalton's Law
  - Ideal Gas Law

UNIT II – USE HEAT SYSTEMS 10 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1. Explain heat properties

2.2. Describe principles and methods of heat transfer

2.3. Identify heat exchangers

2.4. Explain U and R values

Content

To include but not limited to:

- Principles of heat transfer:
  - Key concepts: transmittance, absorptance, emittance, specific heat, absorber
  - Heat transfer mechanisms of conduction, convection and radiation conduction properties, U and R values
  - Convection at a flat surface or tube
  - Radiation from a flat surface or tube for black or grey bodies
  - Combined conduction and convection through single or multiple flat plates or thin wall tubes
  - Combined convection and radiation
  - Combined conduction, convection and radiation such as fluid in a tank (convection to wall), through wall and/or insulation (conduction) to outside air (convection and radiation)
  - Heat exchangers - parallel, counter flow and cross flow

UNIT III – MEASURE AIR FLOW SYSTEM QUANTITIES 10 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1. Explain the principles of air flow

3.2. Explain the variable related to air flow

3.3. Identify the different types of pressure associated with air flow

3.4. Measure air flow

3.5. Calculate air pressure and other quantities

Content

To include but not limited to:

- Air flow principles:
  - Conservation of mass
  - Conservation of energy
  - Conservation of momentum
- Key concepts: gauge and absolute pressures, duct pressure, static pressure, velocity
- Pressure, total pressure, standard air density, fan capacity.

UNIT IV – INSTALL DUCT WORKS 10 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1. Identify types of duct works

4.2. Classify duct work

4.3. Explain the duct work system

4.4. Interpret duct designs

4.5. Explain advantages and disadvantages of combustion and fuels

4.6. Identify duct components; shape, sizes, duct supply system, fittings terminals

4.7. Determine pressure losses in air distribution system

4.8. Install and seal ducts

4.9. Test ductwork and system performance

Content

To include but not limited to:

- Ductwork design:
  - Ductwork design principles
  - Duct components and materials
  - Duct classification: velocity classification, pressure classification
  - Duct shapes
  - Duct sizing
  - Pressure losses in air distribution system
  - Fan sizing
  - The supply duct system
  - Return duct system
  - Duct fitting and terminal units

- Duct construction and reinforcement
- Ductwork insulation and sealing
- Ductwork testing and system performance

• Combustion and fuels:
  - The combustion process:
  - Fuels - desirable and undesirable characteristics, solid, liquid and gaseous types, their relative advantages and disadvantages and common methods of combustion air/fuel ration - stoichiometric excess or insufficient air

UNIT V - TEST REFRIGERATION SYSTEM 6 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

5.1. Describe components of a refrigeration system
5.2. Explain the vapour compression cycle
5.3. Explain the basic principles and terminologies of refrigeration
5.4. Explain the properties, advantages and disadvantages of the different types of refrigerant
5.5. Describe methods of testing refrigeration system
5.6. Test refrigeration levels

Content

To include but not limited to:

• Basic Principles and Terminology
• Refrigeration heat pump:
  - Conditions of a vapour compression cycle
  - Describe properties of types of refrigerant - designation, properties advantages and disadvantages
  - Energy balance and heat transfers in compressor, evaporator and condenser
  - Superheating and sub cooling with or without suction/liquid heat exchanger

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ASSESSMENT PROCEDURES

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work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role playing, case studies and presentations

CAPSTONE EXPERIENCE DESCRIPTION

Students will be required to:

- Test Duct System
- Test Refrigeration System
- Test Air pressure
- Analyse existing HVAC system
- Prepare report

RESOURCES

Suggested: Wijeysundera, N. E. (2016). Principles of Heating, Ventilation and Air Conditioning with Worked Examples. Singapore: World Scientific Publishing.

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	APPLYING RENEWABLE ENERGY PRINCIPLESAND PRACTICES (Renewable Energy 1)
COURSE CODE:	COSEREN1101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 1, SEMESTER 1
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to execute work functions such as installations, repairs, testing and maintenance of facilities powered by renewable energy sources.

LEARNER OUTCOMES/INSTRUCTIONAL OBJECTIVE

Upon completion of this unit, students are competent when they are able to:

1. Interpret relevant regulations, codes of practice and OHS requirements
2. Comply with relevant regulations, codes of practice and OHS requirements
3. Develop engineering solutions for renewable energy problems in accordance
4. Test, document and implement engineering solution for renewable energy problems
5. Recommend appropriate solution for specified Renewable Energy system problems
6. Become competent and qualified persons to implement solutions to renewable energy problems by pursuing lifelong learning activities and professional development

UNIT I – INTERPRET REGULATIONS 4 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1. Interpret relevant regulations, codes of practice and OHS requirements

1.2. Comply with relevant regulations, codes of practice and OHS requirements

1.3. Explain the need for regulations in the practice of renewable energy sector

1.4. Describe the roles and responsibilities of organizations regulating the implementation of renewable energy in Jamaica

1.5. Obtain permits or certificates to operate in the renewable energy sector

Content

To include but not limited to:

- Legislation and regulation relevant to residential, office and retail premises encompassing:
- National Building Code of Jamaica
- Jamaican Standards for Energy Auditing
- State based legislation for energy management in business
- NABERS Tenancy
- NABERS Office
- Building Energy Efficiency Certificates
- Renewable Energy Credits
- Small Technology Credits
- National Energy Solution Limited

UNIT II – SCIENCE FOR RENEWABLE ENERGY FUNDAMENTALS 6 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1. Summarise the scientific principles relevant to the practices of renewable energy

2.2. Explain the scientific nature of matter

2.3. Perform calculations for mass, volume, force and temperature

2.4. Measure quantities using scientific notations

Content

To include but not limited to:

- Concepts encompassing:
  - Nature of matter - atoms, molecules, inter-molecular forces, molecular motion, states of matter.
  - Mass and conservation of mass principle, volume density, specific volume, relative density volume, density, specific volume, relative density
  - Force, weight, pressure (atmospheric, gauge and absolute)
  - Temperature (Celsius and Kelvin)

UNIT III – ENERGY SYSTEMS 4 HOURS

Specific Objectives

Students are competent when they are able to:

3.1 Identify characteristics of energy systems

3.2 Explain the economic roles of energy systems

3.3 Explain the need for energy and its impact on the standard of living

3.4 Discuss the environmental impact of energy systems

3.5 Identify the different types of energy sources

3.6 Explain the impact of an "open system" and "closed system" and their relationship to the transfer of energy

3.7 Use energy systems

3.8 Perform basic calculations

Content

To include but not limited to:

- Energy and humanity encompassing:
  - Need for energy and relationship between energy usage and standard of living
  - Energy conversion - typical processes and efficiencies
  - Sources of energy
  - Reciprocating piston and cylinder mechanism – pressure ratio and compression ratio
  - Energy encompassing:
  - Definition and principles
  - Potential energy
  - Kinetic energy

- Work (linear and rotational), constant and variable force, relationship to pressure and volume change
- Power (linear and rotational)
- Sensible heat - specific heat capacity (constant pressure and constant volume)
- Latent heat
- Chemical energy - energy content of a fuel
- Internal energy

• Energy transfer in closed and open systems encompassing:
  - Definition of a closed system
  - Calorimetry as an example of a closed system (with or without phase change)
  - Non-flow energy equation - typical applications such as stirring with simultaneous heating or cooling
  - Definition of an open system
  - Mass and volume flow rate and continuity equation
  - Steady flow energy equation (negligible change in kinetic or potential energy) leading to the concept of enthalpy - typical applications such as turbines, compressors, boilers and heat exchangers

UNIT IV - HANDLE GASES 6 HOURS

Specific Objectives

Students are competent when they are able to:

4.1 Explain the molecular model for gases

4.2 Identify the types of gases

4.3 Identify an ideal gas in terms of its molecular model

4.4 Explain the characteristics of gas equations

4.5 Identify factors impacting gas equations

4.6 Use processes related to types of gases

Content

To include but not limited

• Gases encompassing:
  - Definition of a perfect or ideal gas in terms of the molecular model
  - General gas equation

- Characteristic gas equation (equation of state)
- Constant pressure process
- Constant volume process
- Isothermal process
- Polytrophic process
- Adiabatic process

UNIT V– HANDLE HEATS 6 HOURS

Specific Objectives

5.1 Students are competent when they are able to:

5.2 Identify the sources of heats

5.3 Identify the types of heat engines

5.4 Explain the need for heat engines

5.5 Differentiate among the types of heat sources

5.6 Monitor heat engine performance

5.7 Measure engine quantities

Content

To include but not limited to:

- Heat engines encompassing:
  - Definition of a heat engine
  - Essentials of a heat engine - heat source, heat sink, working substance, mechanical power output, working cycle
  - Energy balance for a heat engine (as a black box) and efficiency
  - Maximum possible efficiency (carnot efficiency)
  - Types of heat engines according to working substance, heat source, mechanical arrangement and working cycle
  - Typical practical cycles - stirling, otto, diesel, dual, two stroke (spark and compression) ignition, joule cycle
  - Thermodynamic
- Heat engine performance encompassing:
  - Measurement of torque and power output - rope brake, shoe brake, hydraulic dynamometer, electric dynamometer

- Heat supply rate, efficiency, specific fuel consumption
- Measurement of indicated power - mechanical indicator, electric/electronic indicator, Morse test

UNIT VI – ANALYSE POWER GENERATION AND DISTRIBUTION 8 HOURS

Specific Objectives

Students are competent when they are able to:

6.1 Explain the system of power generation and distribution

6.2 Explain the purpose of the national grid

6.3 Determine the utility requirement for the distribution of voltage generated

6.4 Explain the limitations and factors affecting generation and distribution of renewable energy voltage

Content

To include but not limited to:

- Distributed generation issues
  - Utility requirements for interconnection safety of personnel islanding grid stability
  - Voltage regulation
  - Potential benefits of "dg"
  - Limitations in design of distribution circuits (designed for 1-way operation)
  - Match between supply and demand
  - Operation: dispatchable and non-dispatchable supplies
  - Factors affecting the sizing of distributed generation
  - Use of energy storage
- Renewable energy supplies issues encompassing:
  - Limits to penetration
  - Factors affecting the value of renewable on the grid
  - Implications of renewable input on power system operation
  - Connection of energy systems via inverters
- Factors affecting the uptake of distributed generation encompassing:
  - Institutional factors
  - Regulatory factors
  - Policy including mandated targets
  - Green power market
  - Financial issues

- Contractual issues

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ASSESSMENT PROCEDURES

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On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role playing, case studies and presentations.

CAPSTONE EXPERIENCE DESCRIPTION

Student will be given a major piece of assignment involving the principles of the course

RESOURCES

1. Suggested: Goodstal, G. (2013). Electrical theory for renewable energy. Clifton Park, NY: Delmar
2. Lecturers, Equipment, tools, component parts, air conditioner unit

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	COMMUNICATING EFFECTIVELY IN THE WORKPLACE I
COURSE CODE:	COSEACM1101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 1, SEMESTER 1
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to use standard communication and presentation skills that are important to and necessary in the Industry.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon successful completion of this course, the learner will be competent when they are able to:

1. Obtain required information using open and closed questioning techniques
2. Identify the behavioural styles and the challenges associated with them
3. Describe a model of feedback, communication and listening
4. Organise information in a clear and concise manner in writing and speech
5. Create a positively impactful introduction, inclusive of dress choices
6. Implement techniques for varying tones, pitch and body language
7. Deliver effective presentations using public speaking and presentation techniques

UNIT I – THE COMMUNICATION PROCESS 9 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1. Describe the impact of effective communication

1.2. Explain the relationships between the elements of the communication process

1.3. Describe barriers to effective communication

1.4. Describe ways of overcoming barriers to effective communication

1.5. Apply the forms of communication in the workplace

Content

To include but not limited to:

- Elements of communication
- The communication process
- Barriers to effective communication
- Forms of communication

UNIT II – UNDERSTANDING COMMUNICATION STYLES 6 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1. Discuss types of sentences, phrases and clauses

2.2. Identify main ideas

2.3. Understand idea linkages

2.4. Practice improving his/her content and delivery

Content

To include but not limited to:

- Types of sentences, phrases and clauses
- Main ideas
- Idea linkages
- Language usage – Figurative, Rhetorical
- How to improve content and delivery

UNIT III – LISTENING EFFECTIVELY 12 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1. Focus on the speaker

3.2. Identify details

3.3. Empathise with what is being said

3.4. Analyse and respond to the speaker

3.5. Identify and address the major barriers to effecting listening

3.6. Listen effectively

Content

To include but not limited to:

- How messages are sent and received
- Identifying details
  - Word choice, idioms and cliché
  - Tone and allusion
  - Determining speaker intent
  - Denotation and connotation
- Conversion from direct to indirect speech and vice versa
- Listening techniques
- Deciphering what is important and less important

UNIT IV – SPEAKING AND WRITING CORRECTLY 9 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1. Communicate with guests and co-workers easily and effectively using Standard English

4.2. Demonstrate note-taking techniques

4.3. Complete precise writing exercises

4.4. Discuss figures of speech

Content

To include but not limited to:

- The parts of speech
- Correct use of pronouns

- Comparison of adjectives
- The function of words
- Precise writing and note-taking
- Figures of speech, idioms, metaphors, similes, etc.

UNIT V – COMMUNICATING TO INFLUENCE AND INSPIRE 6 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

5.1. Select the correct words and phrases for directness and simplicity

5.2. Identify 'power' words and phrases

5.3. Create simple sentences and phrases commonly used in the industry to satisfy customers

5.4. Design and deliver effective speeches/presentations

Content

To include but not limited to:

- How to communicate in the work environment
- Speaking to inform
- Speaking to persuade
- Presentations
    - Preparing for presentations
    - Organizing content
    - Contemporary visual aids
    - Delivery and follow-up

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Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%

4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role playing, case studies and presentations.

CAPSTONE EXPERIENCE DESCRIPTION

Student will be given a major piece of assignment involving the principles of the course

RESOURCES

1. Required: Communicating Today: The Essentials Zeuschner, Raymond. (2003).California State University Pearson Education, Inc.
2. Critical Thinking and Everyday Argument, Verlinden, Jay wadsworth, (2005) Cengage learning

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	USING COMPUTER APPLICATIONS
COURSE CODE:	COSECAP1101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	1
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 1, SEMESTER 1
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to conduct internet searches, perform word processing activities, create spreadsheets, create presentation graphics and manage databases. This will enable them to produce documents and perform routine data analysis functions that would be required of an entry level professional.

LEARNER OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon successful completion of this unit, students are competent when they are able to:

1. Access and use the Internet
2. Understand the importance of productivity tools for workplace efficiency
3. Create, edit and print documents
4. Manage and analyse data

UNIT I – INTRODUCTION TO THE INTERNET AND THE WORLD WIDE WEB (3 HOURS)

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

1.1. Access a webpage using a web browser

1.2. Locate information on the Internet using a search engine

1.3. Send and receive e-mails with attachments

Content

To include but not limited to:

- Using a browser (view and clear the history, create bookmarks, open a new window)
- Using a search engine:
- The difference between the internet and the World Wide Web
- Basic search
- Filter search
- By time, date, images, maps etc.
- Sending and receiving email (reply, reply to all, forwarding, attachments, copying (cc))

UNIT II – WORD PROCESSING (12 HOURS)

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

2.1. Format a report using pre-defined word processing features

2.2. Adhere to APA or other writing styles when preparing documents

2.3. Edit and format documents using application tools to increase efficiency

2.4. Insert objects into a document

2.5. Prepare letters for multiple recipients

2.6. Save and retrieve documents

2.7. Print documents

Content

To include but not limited to:

- Format a report using pre-defined word processing features
  - Text formatting (font type & size, italics, bold, centre, left-align, right-align, underline, subscript, superscript)

- Paragraph formatting (paragraph spacing, line spacing, prevent heading from separating from a paragraph, keep paragraph from separating inappropriately)
- Page formatting (orientation, size, numbering, page break, section break

- APA or other writing styles to produce term papers
  - insert citations (from books, journals, electronic sources etc)
  - format quotations (long & short)
  - format headings for inclusion in the software-generated table of contents
  - insert headers, footers, footnotes
  - generate bibliography/reference list
  - generate and edit table of contents
- Use editing tools to increase efficiency (copy & paste, find and replace, spell check, bullet and numbering)
- Inserting objects (picture, shapes, organizational chart)
- prepare letters for multiple recipients
  - layout of a block style letter (insert date, centre letter on page)
  - link letter with recipient's list
  - insert recipient information
  - perform mail merge (all records, specific records, for printing)
- Printing (single and multiple copies, selected pages)

UNIT III – MULTIMEDIA PRESENTATIONS (6 HOURS)

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

4.1 Create a multimedia presentation

4.2 Run a multimedia presentation

4.3 Modify a multimedia presentation

4.4 Print a multimedia presentation

Content

To include but not limited to:

- Creating a presentation/slideshow
  - Add new slides
  - Insert objects (text, picture, graph, table, video, sound, hyperlink)

- Animate objects (customized animation, timing)

- Run a presentation (from the beginning, from selected slide)
- View and edit presentations
- Modify slides (insert new slides, insert duplicate slides, delete slides, rearrange slides, slide design, slide background)
- Print presentation (single slides, Handouts, Notes Page)

UNIT IV – SPREADSHEETS (12 HOURS)

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

4.1. Use formulas and functions to manipulate and analyse data

4.2. Use a formula to manipulate data located in another worksheet

4.3. Format cell data

4.4. Create and format graphs

4.5. Format a workbook page

4.6. Print in spreadsheet

Content

To include but not limited to:

- Formulas and functions:
  - Add, subtract, multiply and divide values in a range
  - Convert measurements from one unit to another
  - Calculate the average of numbers in a range
  - Determine the smallest number in a range
  - Determine the largest number in a range
  - Extract data that meet a given criteria
  - Log tables
  - Loan amortization
  - Goal seek/data tables
  - Round numbers to a specified decimal place
  - Use range names
  - Data validation prevents inappropriate entries and gives appropriate error message
  - Nested functions are used to provide solutions to complex problems

- Use conditional formulas (if, sum if, count if, lookup, hook-up)
- Insert/delete row, column, cell, cell data
- Date operations (insert current and other date)
- Calculate the difference between two dates
- Sort data ascending or descending order (using single column, using multiple column)
- Format data (number, date, conditional, protect/lock cells, merge cells, merge & centre)
- Use a formula to manipulate data located in another worksheet
  - Copying formulas and functions (Absolute cell referencing, Relative cell referencing)
- Page formatting:
  - Default margins, Changing the margins (Left, Right, top, bottom)
  - Default paper size, Changing Paper size (Letter size, Legal size)
  - Page Orientation
  - Add header/footer, custom header/footer
- Create and format graphs (including scatter graph, line graph, pie, bar)
  - Insert chart titles, axes, gridlines, legends, labels, the data source, trend lines
  - Save graph (as separate sheet, as part of current sheet)
- Printing spreadsheet (entire worksheet, specific parts of worksheet, scaling page)

UNIT V – DATABASE MANAGEMENT (10 HOURS)

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

5.1. Define key database terms: field, record, relational database, primary key and foreign key
5.2. Create a database table
5.3. Manipulate a database table
5.4. Create a relationship between two tables
5.5. Create queries, forms and reports
5.6. Import data from a spreadsheet

Content

To include but not limited to:

- Define the terms: field, record, relational database, primary key and foreign key
- Create a database table

- Define fields (data type, properties – default value, validation rule, validation text, data required, duplicates allowed, caption)
- Select/assign primary key
- Populate table

- Manipulate a table
  - Modify the structure of a table (delete, move and add fields)
  - Copy records, Insert, delete and change records
- Create a relationship between two tables
- Querying a Database (select, update, delete)
  - Sort data in a query
  - Logical operators (exact match, and, or)
  - Using wildcard to specify search/selection criteria
- Reports
  - Create report (using data from a table, from a query)
  - Insert a picture in a report
- Importing data from a spreadsheet

……

ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

- Lectures
- Lab
- Discussions
- Demonstrations

CAPSTONE EXPERIENCE DESCRIPTION

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RESOURCES

??????????????

CAPSTONE EXPERIENCE DESCRIPTION

- The project should require that students demonstrate competencies in each the use of the productivity tool to
- Format a report/school assignment according to the rules of a formal documentation style
- Solve a problem that would be encountered in a renewable energy workspace.

Students may select their own project for which the measurement criteria for assessing competency attainment would have been given at the beginning of the semester.

The student must provide the teacher with a written project description which will provide evidence that the project is of such that it will allow for students to display the relevant competencies in a context that is applicable to the renewable energy sector.

The teacher will give written approval before the student begins work on the project.

As evidence of competence for (a) above, an assignment that was produced for another course in the programme may be submitted for grading. Marks will be awarded for evidence of competencies in the use of a word processing software to create and format an assignment according to the rules of a formal documentation style, not for content.

It is expected that the teacher will provide guidance throughout the life of the project. It is expected, also, that the teacher's feedback will provide information that serve as a guide for students to recognize and correct errors in their work. The intent must always be for students to be able to improve the quality of the evidence of competency that they submit for marking.
It is recommended that students complete each component of the project as the relevant competencies are attained, as this will make the work more manageable.

The project will be submitted for grading at the end of the instructional period. A signed statement by the student, to indicate that the submission is work of his or her own effort, must accompany the submission.

The teacher, having monitored the student throughout, will also submit, along with the grades and a sample taken from the population of student's work, a signed statement that indicate that the teacher has taken all reasonable steps to ensure that each grade was earned by the student's own effort.

SCORING RUBRICS REPORTS

COMPETENCIES	MARKS ALOTTED	MARKS EARNED
Correct margins	**1**	
- adjusted for binding (1)		
- not adjusted for binding (0)		
Page number	**1**	
- present and appropriately formatted (1)		
Sections	**2**	
- page formatting *(orientation, size, or margins)* changed within the document		
Paragraph formatting	**5**	
- appropriate indentation (1)		
- appropriate line spacing (1)		
- appropriate font type (1)		
- appropriate font size (1)		
- no inappropriate breaks (1)		
Main headings	**3**	
- ALL appropriately formatted (2)		
- formatted using the word processing styles feature (1)		
Sub headings	**3**	
- ALL appropriately formatted (2)		
- formatted using the word processing styles feature (1)		
Object included	**1**	
Table of contents	**1**	
- table of content present and generated by software (1)		
- not generated by software (0)		
Citation	**1**	
- using the appropriate software feature (1) - created but not using the software feature (0)		
Reference list appropriately formatted	**4**	
- appropriately indented (1)		
- appropriately arranged (1)		
- appropriate line spacing (1)		
- generated by software (1)		
TOTAL	**22**	

LETTER AND MAIL MERGE

COMPETENCIES	MARKS ALOTTED	MARKS EARNED
Appropriate letter head	**1**	
Date inserted by software	**1**	
Appropriate formatting	**6**	
- Correct margins (1)		
- Paragraph spacing (1)		
- Paragraph indentation (1)		
- Line spacing (1)		
- Font (1)		
- Text appropriately positioned on the page (1)		
Mail Merge	**5**	
Primary document (1)		
Appropriate mail merge fields (1)		
Source document (1)		
Merge is correct (1)		
TOTAL MARKS	**13**	

SPREADSHEET MARK SHEME

COMPETENCIES	MARKS ALOTTED	MARKS EARNED
Use formulas and functions:		
Formulas are appropriate for solving the stated problem	2	
Data validation prevents inappropriate entries and gives appropriate error message	2	
Sort data using more than one variable	1	
Formula duplicated and data is correct *(Constants are placed in cells, data is not placed directly in formula)*	1	
Lookup function returns correct values from table in a separate spreadsheet	1	
Correct action is performed based on given criterion or other appropriate data	1	
Measurement is correctly converted from one unit to another	1	
Numbers are rounded using appropriate spreadsheet function	1	
Conditional formatting is used to highlight exceptions	1	
Date function appropriately used	1	
Goal seek/Data table/log table appropriately used and produces correct information	2	
Formatting/Layout		
Spreadsheet is laid out to facilitate insertion/deletion	1	
Spreadsheet is laid out so that it can be easily interpreted	1	
Inserted row/column does not affect previously inserted spreadsheet formulae	1	
Footer/header used to communicate appropriate information	1	
Column and row headings are appropriate	1	
Page size/orientation appropriate	1	

Graphs		
Appropriate charts to represent spreadsheet data are created	2	
Graphs are appropriately labelled	1	
Extracting data to allow summary information	2	
TOTAL	**25**	

DATABASE MARK SHEME

COMPETENCIES	MARKS ALOTTED	MARKS EARNED
Create and Maintain a SQL Database:		
Create tables using correct field definition and data type	3	
appropriate primary key defined	1	
Modify data *(add/delete, sort)*	2	
Modify table structure *(add/delete fields, change field properties)*	1	
Querying a Database		
data from multiple tables/queries used to generate a new table	2	
query used to modify field content	1	
query used to remove records	1	
multiple conditions used in queries	2	
Reports		
Report on specified fields are generated	2	
Data is grouped	1	
Data is sorted	1	
Data is appropriately summarised *(totalled, averaged, counted etc)*	2	
Header/footer is appropriately used	1	
TOTAL MARKS	**20**	

PRESENTATION

COMPETENCIES	MARKS ALOTTED	MARKS EARNED
Create a Presentation	**8**	
- insert a slide (1)		
- insert duplicate slides (1)		
- delete slide (1)		
- re-arrange slide (1)		
- change presentation design (1)		
- change design for selected slides only (1)		
- format presentation background (1)		
- format individual slide background (1)		
Inserting Elements (graphics, video, sound)	**3**	
- graphics (1)		
- video (1)		
- sound (1)		
Animation	**2**	
- animate an object (1)		
- animate a slide (1)		
Timing	**2**	
- slide transition (1)		
- object transition (1)		
TOTAL MARKS	**15**	

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	PERFORMING ENGINEERING MATHEMATICS CALCULATIONS I
COURSE CODE:	COSETMA1101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 1, SEMESTER 1
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to use trigonometry, determinants, matrices and vectors to solve renewable energy problems.

This course serves to expose the students to more rigorous approach pertaining to the study of mathematics in moving from the secondary level to the intermediary level. In preparation for the study of calculus and engineering mathematics at a later stage the concepts of logarithm and indices, expansion by the binomial theorem, solution of polynomials using remainder and factor theorems and trigonometry are emphasized whereas most of the other topics serve as revision ones extending the earlier concepts further. There is less reliance on the use of calculators despite an attempt to develop further competence in its use.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon successful completion of this course, students are competent when they are able to:

1. Perform mathematical computations and calculations with matrices and vectors

2. Explain the application of trigonometry in the renewable energy field
3. Solve renewable energy problems using differential and integral calculus

UNIT I – TRIGONOMETRY ? HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

1.1 Solve practical problems using Pythagoras Theorem, Sine and Cosine Rules.

1.2 Derive and use trigonometric identities such as:

- Reciprocal and quotient identities
- Pythagorean identities
- Sums and differences identities
- Double-angle identities
- Half-angle identities

1.3 Use compound-angle formulae for

1.4 Use the reciprocal functions of trigonometry

1.5 Use the exponential form of inverse hyperbolic function:

1.6 Identify and use the properties of right angle spherical triangles.

1.7 Identify and use the properties of quadrilateral spherical triangles.

1.8 Apply Napier's Rule to spherical triangles

Content

To include but not limited to:

- Trigonometry rules: Pythagoras Theorem, Sine rule, Cosine rule
- Trigonometric identities
- Compound-angle formulae
- Reciprocal trigonometric functions
- Inverse hyperbolic trigonometric functions
- Right-angle and quadrilateral spherical triangles
- Napier's Rule

UNIT II – DETERMINANTS AND MATRICES ?

HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

2.1 Classify matrices as column, row, null, square, diagonal and triangular

2.2 Perform basic matrix algebra: addition, subtraction, transpose and multiplication

2.3 Operate with conformable matrices, carry out simple operations and manipulate matrices using their properties;

2.4 Evaluate the determinants of matrices;

2.5 Use the properties of determinant

2.6 Solve a system of linear equations using matrices and determinants;

2.7 Solve a system of linear equations using Cramer's rule.

Content

To include but not limited to:

- Types of Matrices
- Matrix Algebra: addition, subtraction, transpose and multiplication
- Determinant of matrices
- Solution of linear simultaneous equations
- Cramer's rule:

UNIT III - VECTORS ? HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

3.1. Express a vector in the form where are unit vectors in the direction of axis respectively;

3.2 Define equality of vectors;

3.3 Add and subtract vectors;

3.4 Perform vector multiplication by a scalar quantity;

3.5 Derive and use unit, position and displacement vectors;

3.6 Find the magnitude and direction of a vector;

3.7 Find the angle between two given vectors using scalar (dot) product;

3.8 Perform vector (cross) product of two vectors;

3.9. Perform vector rotation using data

Content

To include but not limited to:

- Vector notation
- Equality of vectors
- Addition and subtraction of vectors
- Vector multiplication by a scalar
- Position, unit and displacement vectors
- Scalar (Dot) Product and Vector (Cross) Product
- Rotating Vectors

ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role playing, case studies and presentations.

CAPSTONE EXPERIENCE DESCRIPTION

Students will use the skills and knowledge to design and install different types of A.C. circuits. Use measurement to determine electrical quantities and use known laws to calculate electrical quantities.

RESOURCES

- Lecturer

COURSE OUTLINES

YEAR 1

SEMESTER 2

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	PROVIDING CUSTOMER SERVICE
COURSE CODE:	COSEPCC1102
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 1, SEMESTER 2
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to provide good customer service. It focuses on developing awareness of the importance of customer service to the success of renewable energy sector, building and maintaining customer loyalty, dealing with difficult customers, presenting a professional image and participating in teamwork.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course students are competent when they are able to : create an appreciation of the importance of quality customer care for customers (internal and external) assist in improving quality customer service techniques , develop attitudes to provide quality service delivery, create and add value and respect people at all levels of the organization, management and customers.

Upon successful completion of this course, students are competent when they are able to:

1. Understand the importance of customer service to the business

2. Explain the ways in which customer standards improve the quality of service
3. Demonstrate interpersonal skills necessary for the delivery of quality customer service
4. Apply conflict resolution techniques
5. Solve customer complaints
6. Follow professional codes of conduct to enhancement of quality customer care
7. Interpret and follow customer service policies
8. Provide quality customer service

UNIT I DEVELOP KNOWLEDGE OF THE CUSTOMER 6 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

1.1 Provide excellent customer service
1.2 Handle different types of customers
1.3 Distinguish between internal and external customers
1.4 Identify the fundamental needs of customers
1.5 Determine the major factors customers use to "RATE" service quality
1.6 Identify components of the customer's "Bill of Rights"
1.7 Determine the characteristics of the types of customers
1.8 Use customer profile to address particular needs

Content

To include but not limited to:

- Characteristics of quality customer service
- Identify mediocre customer service
- Types of customers and their characteristics/profiles
- Internal vs. external customers
- Fundamental needs of customers
- Major factors used to RATE service quality
- Customers' "Bill of Rights"

UNIT II DEVELOP CUSTOMER LOYALTY 9 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they able to:

2.1 Define the term "customer loyalty"

2.2 Listen to and address the customers concerns

2.3 Follow the processes and procedures in delivering quality customer service

2.4 Explain the impact of "total quality focus" on customer loyalty

2.5 Apply proactive approaches to build customer loyalty

2.6 Explain how customer loyalty impacts the organizations' development and profitability

Contents

To include but not limited to:

- Total quality focus
- Definition of customer loyalty
- Total quality focus
- Proactive approaches to customer contact
- Impact on customer loyalty

UNIT III PRACTICE GOOD ATTITUDES AND HABITS FOR CUSTOMER SERVICE 6 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Determine the effects of poor "attitude" on quality customer service

3.2 Develop effective habits and attitudes towards quality service

3.3 Explain the advantages of good attitudes to:

- the service provider
- the customers
- the organization

3.4 Follow approved procedures for interacting with customers

3.5 Provide service to customers that builds repeat business

Content

To include but not limited to:

- Definition of "attitude"
- Definition of "habit"
- Characteristics of positive and negative attitudes
- Behavior patterns impacting quality customer service
- Advantages of a good attitude
- Body language
- Factors affecting customers' loss

UNIT IV – DEAL WITH DIFFICULT CUSTOMERS 9 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1 Identify major reasons why customers get upset/make complaints

4.2 Apply procedures to deal with types of difficult customers

4.3 Analyse outcomes from the service encounter with difficult customers

4.4 Explain the conceptual framework of service recovery and fallout

4.5 Implement strategies to address customer dissatisfaction/service recovery and fallout

4.6 Follow approved procedures to handle customers' complaints

4.7 Distinguish between "listening" and "hearing"

4.8 Explain the importance of listening to customers in the delivery of quality customer service

4.9 Apply steps to listening to and provide feedback to customers

4.10 Identify the strategies for effective listening/active listening

4.11 Use the seven-step (7-step) Customer Complaints Resolution Model

4.12 Refer unresolved issues with difficult customers to appropriate authority level

Content

To include but not limited to:

- Dissatisfied customers
- Difficult customers
- Service encounter
- Service recovery and fallout procedures
- Strategies addressing customer dissatisfaction, service recovery and fallout
- Handling customer complaints

- Listening vs. hearing
- Importance of listening to difficult customers
- Good listening skills

UNIT V- DEVELOP AND PROJECT PROFESSIONAL IMAGE 6 HOURS

Specific Objective

Upon successful completion of this unit, students are competent when they are able to:

5.1 Interpret the term "professionalism"

5.2 Demonstrate professionalism at the workplace and off the job

5.3 Acquire opportunities to improve and maintain professional competencies

5.4 Apply guidelines to develop professionalism at the workplace

5.5 Encourage and support the professional development of staff and other colleagues

5.6 Participate in professional development activities of the organization

5.7 Join and participate in professional organization

5.8 Read professional publications to update industry knowledge

5.9 Acquire and maintain professional certifications

Content

To include but not limited to:

- Definition of "professionalism"
- Professional Organizations
- Professional development organizations and opportunities
- Professionalism at work
- Delivering professional services
- Professional Publications
- Strategies for providing professional services
- Professional Certifications

UNIT VI – PARTICIPATE IN TEAMWORK 6 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they able to:

6.1 Lead and develop work teams

6.2 Explain the role of teamwork in attaining organization's goals

6.3 Identify the advantages of teamwork

6.4 Explain the disadvantages of poor teamwork

6.5 Identify the components of great teamwork

6.6 Use teamwork in the delivery of quality customer care

Content

To include but not limited to:

- Definition of "teamwork"
- The role of teamwork in building relations
- Advantages and disadvantages of teamwork
- Components of great teamwork
- Importance of teamwork in the delivery of customer care
- Traits of a good team leader

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role play, case studies and presentations.

RESOURCES

Required:

1. Quality Customer Care for the Caribbean, Dr. Ben Henry

Suggested Reading:

2. Food and Beverage Service, 9th Edition 2014, J Cousins, Lillicrap& S Weekes; published by Hodder Education

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	PERFORMING ENGINEERING MATHEMATICS CALCULATIONS II
COURSE CODE:	COSETMA1201
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	PERFORMING ENGINEERING MATHEMATICS CALCULATIONS I
YEAR/SEM.:	YEAR 1, SEMESTER 2
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to perform calculations in the renewable industry using various mathematical principles and concepts.

The course serves to expose the students to a more rigorous approach pertaining to the study of mathematics in moving from the secondary level to the intermediary level. In preparation for the study of calculus and engineering mathematics at a later stage the concepts of logarithm and indices, expansion by the binomial theorem, solution of polynomials using remainder and factor theorems and trigonometry are emphasized whereas most of the other topics serve as revision ones extending the earlier concepts further. There is less reliance on the use of calculators despite an attempt to develop further competence in its use.

LEARNING OUTCOMES/INSTRUCTIONAL OBJECTIVES

On completion of this course, students should be able to:

1. Manipulate sordid quantities with the aim to obtain simplified irrational number
2. Perform arithmetic operations on the sum and product of the roots of quadratic equations to form new equations conforming to specified relationships
3. Resolve composite/rational algebraic fractions into simple linear and quadratic fractions
4. Understand the nature of functions and the methods of compounding them and in finding their inverses
5. Use inequalities (or in equations) in order to find solution, range(s) on number lines or other regions in space
6. Apply the rules of indices and logarithm in the evaluation, simplification and solution of equations
7. Use Remainder and Factor Theorems to find unknown coefficients in polynomials as well as in factorizing and solving them
8. Review coordinate geometry to reinforce the principle and also extend them further
9. Apply the various identities, formulae and principles in solving trigonometric equations and in proving identities

UNIT I – SURDS 3 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

1.1. Categorize the number system with real numbers vs. complex numbers and rational

1.2. Irrational numbers

1.3. Identify surds as irrational numbers

1.4. Represent surds as the square root a number with a prime multiplier raised to an odd-power

1.5. Simplify surds after performing arithmetic operations as well as rationalizing the denominator

Content

To include but limited to:

- Categorization of the number system into
  - Real numbers: rational vs. irrational numbers

- Real numbers vs. complex numbers
- Surds
- Complex numbers (real and imaginary parts)

- Representation of:
  - Surds as, c has an odd-prime factor
- Simplification of surds:
- Performing arithmetic operations (addition, subtraction, multiplication and division)
  - Rationalization of the denominator
  - Express in the form a + b

UNIT II – QUADRATIC EQUATIONS AND THEIR ROOTS 7 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

2.1. Adopt the quadratic equation ax2 + b x + c = 0 with roots.

2.2. Establish a relationship between the roots and coefficients of a quadratic equation

2.3. Compute the sum of the root and the product of the roots without solving the quadratic equation

2.4. Manipulate the above sum and product to find various combinations of values of .

2.5. Find a new equation with roots related to

2.6. The conditions for coincident roots, distinct roots and roots that are opposite in signs based on the discriminant b2 – 4ac

2.7. Manipulate the roots of the cubic equation ax3 + bx2 + cx + d = 0 and verify established relationships

2.8. Use the sum of the roots, the sum-product of the roots and the product of the roots to solve cubic equation with integer and rational roots

2.9. Solve polynomials involving the moduli

Content

To include but not limited to:

- Adopting:
  - The quadratic equation ax2 + b x + c = 0

- With roots to

- Establishing relationships:
  - Sum of roots = ; product of roots =
  - Based on the discriminant b2 – 4ac:
  - Coincident roots
  - Distinct roots
  - Roots equal in magnitude opposite in signs
- Forming new equations based on:
  - computing the sum and product of the roots of a given quadratic equation
  - Changes/combinations of the roots
- Relationships of the roots of a cubic equation
  - Sum of the roots:
  - Sum-product of roots =
  - Product of roots =
- Solving equations
  - Using the relationship pertaining to their roots
  - Solving algebraic equations involving the moduli
  - $|ax + b| = c$
  - $|dx + e| - |fx + g| = h$

UNIT III – PARTIAL FRACTIONS 3 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

3.1. Define relevant terms

3.2. Differentiate among simple fractions and various types of partial fractions

3.3. Decompose composite algebraic fractions (including improper fractions) into a combinations of partial fractions with unknown constants

3.4. Solve for the unknown constants

Content:

To include but not limited to:

- Definition of the terms used
- Differentiating:
  - Simple and composite fractions
  - Among the various types of partial fractions
- Decomposition into:
  - Distinct linear factors
  - Linear and quadratic factors
  - Solving for the unknown constants

UNIT IV – FUNCTIONS 7 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

4.1. Define relevant terms

4.2. Recognize a function as ordered-pairs or a mapping from one set (a domain) to another set (a co-domain or range)

4.3. Represent a function graphically, algebraically or in functional form for linear, quadratic, exponential or logarithmic expressions recognize functions that are undefined

4.4. Determine the value(s) making such functions undefined

4.5. Perform operations on functions such as compounding and finding inverse

4.6. Demonstrate the relationship g(f(x))-1 = f-1g-1 (x)

Content:

To include but not limited to:

- Definition of terms
- Recognition of a function as:
  - Ordered-pairs
  - A mapping from a domain to a co-domain (or range)
  - An algebraic expression
  - Continuous or discrete
  - Undefined with corresponding value(s)
- Representation as/in:
  - Graphically
  - Algebraically

- Functional form

- Determination of the values of undefined functions
- Performing operations on functions
  - compounding functions: f(g(x))
  - inverting functions
- Proving/demonstrating the relationship g(f(x))-1 = f-1(g-1 (x)) and others relationships

UNIT V – INEQUALITIES 4 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

5.1. Define relevant terms

5.2. Differentiate among identities, inequalities and equations

5.3. Differentiate between linear and quadratic inequalities (or inequations)

5.4. Solve linear and quadratic inequalities graphically or analytically represent the result(s) above on a number line and/or graph

Content:

To include but limited to:

- Definition of the terms used
- Differentiation of inequalities:
  - Polynomials: linear, quadratic, cubic, etc.
  - Rational algebraic expression
  - Algebraic expressions:
  - Identities
  - Functions
  - Equations
- Solving:
  - Linear inequalities
  - Quadratic inequalities
  - Rational algebraic inequalities
  - Polynomials with the moduli:

- Representation on:
  - Number line
  - Graph duly shaded

UNIT VI – INDICES AND LOGARITHM 10 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

6.1 Define relevant terms

6.2 Represent numbers and terms in index form and as logarithm

6.3 Express the rules of indices and logarithm

6.4 Evaluate the numbers using indices and/or logarithm

6.5 Change of base in indices and/or logarithm

6.6 Simplify terms and expressions using indices or logarithm

6.7 Solving equations using indices and/or logarithm

Content:

To include but not limited to:

- Definition of terms used
- Representation in:
- Index or exponential form ax
- Logarithmic form log10x or loge y
- Evaluation of number or terms using:
  - Indices
  - Logarithm
- Changing the base of:
  - Indices: ax = e xlogea
  - Simplification of terms or expression:
  - Indices
  - Logarithm
  - Solving equations using:
  - Indices
  - Logarithm

- Both of the above

UNIT VII – REMAINDER THEOREM AND FACTOR THEOREM 8 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

7.1. Define relevant terms

7.2. Perform arithmetical operations on polynomial functions with emphasis on division to obtain remainders

7.3. Make use of Remainder Theorem to obtain remainder and compare with the method of algebraic or synthetic division

7.4. Reduce the Remainder Theorem to Factor Theorem and in the factorization of polynomials up to the third degree.

7.5. Select the trial method in the factorization and solution of polynomial

Content

To include but not limited to

- Definition of the terms used
- Performing arithmetic operations on polynomials:
  - Addition and subtraction
  - Multiplication and division
  - obtaining remainders by algebraic division or synthetic division
- Applying Remainder Theorem:
  - To obtain remainders by a shorter alternative means
  - deduce the Factor Theorem for zero remainders
  - To obtain unknown coefficient(s)
  - factorize polynomial expression by a trial method or otherwise
  - solve polynomial equation based on the factorization above

UNIT VIII– COORDINATE GEOMETRY (THE STRAIGHT LINE) 8 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

8.1. Define relevant terms

8.2. Representation of points and line segments in Cartesian systems

8.3. Calculation of lengths of line segments, mid-points and gradients

8.4. Determine the angles between two intersecting lines

8.5. Calculate the areas of triangles and quadrilaterals

8.6. Display the equation of a straight line as the locus of a point moving along a

8.7. Path with a specified gradient

8.8. Determine the equations of straight lines

8.9. Represent the equation of a straight line in perpendicular form and determine the

8.10. Distance between a line and the origin and for parallel line

Content:

To include but not limited to:

- Definition of the terms used
- Representation of
  - Points
  - Line segments
  - Plane figures (triangles and quadrilaterals)
- Calculation of:
  - measures relating to line segments:
  - Lengths, gradients and mid-points
  - Points representing the internal and external bisectors of a line in a given ratio
  - The angles between intersecting lines:
  - Parallel lines
  - Perpendicular lines
  - Areas of triangles and quadrilaterals
- Determination of
  - Equations of a straight line
  - With two fixed points
  - With a fixed point and a given gradient
  - With x-intercept and y-intercept given
- The conditions for

- Parallel lines
- Perpendicular lines

- The perpendicular form of the equation of a straight ax + by = 1
  - Its distance from a fixed point
  - The sign convention relating to the position of the point, the origin and the line
  - The distance between parallel lines
- Conditions for two or more lines to be
  - Coplanar
  - intersecting

UNIT IX– TRIGONOMETRY 8 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

9.1 Define relevant terms

9.2 Compute the six trigonometrical ratios based on right-angled triangles

9.3 Solve problems involving the Sine Rule and Cosine Rule

9.4 Compute the circumference, arcs length, perimeters and areas of circles, sectors, segment and annulus of a circle

9.5 Quote trigonometric identities such as the Pythagorean, compound angles, double - angles, product-sum formulae

9.6 Prove trigonometric identities

Content

To include but not limited to:

- Definition of the terms used
- Computation/evaluation of the trigonometry ratios:
  - Pythagoras' Theorem: (hyp)2 = (adj)2 + (opp)2
  - cos x, sin x tan x, cot x, cosec x, sec x
  - compound angles without calculator or tables
  - inverse trigonometric functions: sin-1 x, etc.
- Solution/calculation for:
  - arc lengths

- circumference/perimeter
- areas of sectors, segments, circles and annulus of circles
- trigonometric equation:
- sin2x = ¾; cot(x - 450) = cos 650
- a sin x + b cos x = c
- General solutions in degrees and radians

• Quoting/proving trigonometric identities
  - Pythagorean identities
  - Compound angles (sum and difference)
  - Double angles

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Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Feedback will be in accordance with institutional policies

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role playing, case studies and presentations.

CAPSTONE EXPERIENCE DESCRIPTION

Students will use the skills and knowledge to design and install different types of A.C. circuits. Use measurement to determine electrical quantities and use known laws to calculate electrical quantities.

RESOURCES

- Lecturer:
- Materials, Tools, and equipment
- Measuring instruments: Wattmeter, Voltmeter, Ammeter

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	ANALYSING A.C. ELECTRICAL CIRCUITS
COURSE CODE:	COSEACC1101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	D.C CIRCUITS
YEAR/SEM.:	YEAR 1, SEMESTER 2
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to work with alternating current (A.C.) circuits. It will also enable them to read circuits diagram, wire different types of circuits, detect faults, resolve problems and use appropriate regulations and procedure to work safely, efficiently and effectively.

LEARNER OUTCOMES/INSTRUCTIONAL OBJECTIVE

Upon successful completion of this course, students are competent when they are able to:

1. Comply with relevant regulations, codes of practice and OHS requirements in ALL operations
2. Prepare to solve problems in A.C. low voltage systems
3. Identify cause of problems in low voltage A.C. Circuits
4. Solve low voltage A.C. Circuit problems efficiently
5. Install A.C. Circuits
6. Measure electrical quantities in A.C. Circuits

7. Document and report problem solving activities
8. Interpret circuit designs and prepare material listings

UNIT I – A.C. CIRCUIT OPERATIONS 7 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

1.1. Differentiate between D.C. an A.C. circuits
1.2. Identify properties of A.C. circuits
1.3. Interpret relevant OHS regulations and codes of practice
1.4. Compare and contrast series, parallel and series-parallel A.C. circuits
1.5. Measure electrical quantities in A.C. circuits
1.6. Wire types of A.C. circuits

Content

To include but not limited to:

- Occupational Health and Safety:
  - Relevant regulations, codes of practice and Occupational Health and Safety requirements in A.C circuits
  - Hazards low A.C. circuits
  - Type of A.C. circuits (parallel, series, series-parallel)
  - Properties of A.C. circuits
- Make use of trigonometry ratios and Pythagoras theorem to demonstrate A.C circuit properties:
  - Sine, cosine and tangent ratios of a right angle triangle
  - Pythagoras theorem to a right angle triangle
  - Sinusoidal voltage generated by a single turn coil rotated in a uniform magnetic fields
  - Terms 'period', 'maximum value', 'peak-to-peak value', 'instantaneous value', 'average value', 'root-mean-square (R.M.S.) Value', in relation to a sinusoidal waveform.
  - Purpose of phasor diagrams
  - 'In-phase', 'out-of-phase', 'phase angle" lead' and 'lag'
  - Phase angle between two or more alternating quantities from a given sinusoidal waveform diagram

- Convention for representing voltage, current and the reference quantity in a phasor diagram

UNIT II – MEASURING INDUCTIVE AND CAPACITIVE REACTANCE IN A.C CIRCUIT ? HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

2.1. Explain inductive and capacitive reaction

2.2. Explain the impact of inductive and capacitive reaction in A.C. circuits

2.3. Solve Inductive reactance problem in A. C. circuits

2.4. Solve capacitive reactance problem in A.C. circuits

2.5. Determine voltage drop

2.6. Explain the effects of impedance in A.C. circuits

Content

To include but not limited to:

- Relationship between voltage drops and current in resistive A.C. circuit
- Applications of resistive A.C. circuits
- Defining inductive and capacitive reactance
- Applications of inductive A.C circuits
- Applications of capacitive A.C circuits
- Impedance and impedance triangle
- Examples of capacitive components in power circuits and systems and the effect on the phase relationship between voltage and current
- Examples of inductive components in power circuits and systems and describe their effect on the phase relationship between voltage and current

UNIT III - Measuring Power in A.C. Circuit ? HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

3.1. Explain the type of power in A.C. circuits

3.2. Use formulae to calculate power

3.3. Identify the difference between true power, apparent power and reactive power A. C. circuits

3.4. Solve A.C. circuit problems involve single phase and power factor

3.5. Measure power in A.C. circuits

3.6. Conduct power factor correction

Content

To include but not limited to:

- Difference:
  - Difference between true power, apparent power and reactive power and the units in which these quantities are measured
  - Defining the term "power factor" and phase angle
- Solve A.C. problems
  - Methods used to measure single phase power, energy and demand
  - Effects of low power factor
  - Requirements for power factor improvement
  - Methods used to improve low power factor of an installation
  - Local supply authority and AS/NZS 3000 wiring rules requirements regarding power factor of an installation and power factor improvement equipment.
  - Methods used to measure single phase power factor
  - Using manufacturers catalogues to select power factor equipment for a particular installation Difference between true power, apparent power and reactive power and the units in which these quantities are measured in a three phase system
  - Methods used to measure three phase power, energy, power factor and demand
  - Determining how the power factor of a three phase installation can be improved

UNIT IV - MEASURE HARMONICS IN A.C. CIRCUITS ?HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

4.1. Explain the concepts of harmonic of an A.C. Power system

4.2. Explain the concepts of resonance of an A.C. circuit

4.3. Measure harmonic in A.C. circuits

4.4. Measure resonance in A.C. circuits

Content

To include but not limited to:

- Harmonic:
  - Term "harmonic" in relation to the sinusoidal waveform of an A.C. Power system
  - Sources in A.C. Systems that produce harmonics
  - Problems that may arise in A.C. Circuits as a result of harmonics and how these are overcome
  - Methods and test equipment used to test for harmonics
  - Methods used to reduce harmonics in A.C. Power system
- Resonance:
  - Conditions in a series A.C. Circuit that produce resonance
  - Dangers of series resonance circuits
  - Conditions in a parallel A.C. Circuit that produce resonance
  - Dangers of parallel resonance circuits
  - Local supply authority requirements concerning harmonics and resonance effect in A.C. Power systems

UNIT V - A.C. POWER SYSTEMS – MULTIPHASE SYSTEM ? HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

5.1. Identify characteristics of multiphase system

5.2. Determine phase relationship in A.C. circuits

5.3. Explain the difference between star and delta connection in an A.C. Power system

5.4. Measure electrical quantities in multiphase system

5.5. Explain how to balanced and unbalanced loads in typical power systems

5.6. Make star and delta connections

5.7. Determine application of star and delta connections

Content

To include but not limited to:

- Star and delta connection
  - Features of a multiphase system
  - Comparison of voltages generated by single and multiphase alternators
  - Reasons for the adoption of three phases for power systems
  - How three phases is generated in a single alternator
  - Relationship between the phase voltages generated in a three phase alternator and the conventions for identifying each
  - Term "phase sequence" (also referred to as "phase rotation")
  - Phase relationship between line and phase voltages and line and phase currents of a star-connected system
- Balance and unbalance loads
  - Terms "balanced load" and "unbalanced load"
  - Terms "balanced load" and "unbalanced load"
  - Effect of a reversed phase winding of a star connected alternator
  - Example of balanced and unbalanced loads in typical power systems
  - Purpose of the neutral conductor in a three phase four wire system
  - Determining the effects of an high impedance in the neutral conductor of a three phase four wire system, supplying an unbalanced load where men earthing is employed
  - Determining the value and phase relationship of neutral current in an unbalanced three phase four wire system, given line currents and power factors
  - Requirements regarding neutral conductors
  - Method for determining voltage drop in unbalanced three phase circuits
  - Phase relationship between line and phase voltages and line and phase currents of a delta-connected system
  - Limitations and uses of open delta connections Effect of a reversed phase winding of a delta connected transformer
  - Example of loads in typical power systems
  - Relationship between line and phase voltages and line and phase currents in the typical interconnected systems using star-connections and delta-connections
  - Purposes for measuring power, energy, power factor and maximum demand of A.C. Power systems and loads

UNIT VI - RESISTIVE, INDUCTIVE, AND CAPACITIVE CIRCUIT (RLC ? HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

6.1 Explain the functions of resistive, inductive, and capacitive circuit

6.2 Resistors, inductors, and capacitors circuit

6.3 Connect simple circuits with resistors, inductors and capacitors

6.4 Calculate electrical quantities for resistor, inductor, and capacitor

6.5 Select an appropriate meter for measuring electrical quantities

6.6 Determine rating/sizes of resistor, inductor, and capacitor

6.7 Test fault crop impedance

Content

To include but not limited to:

- Connect simple circuits
  - Practical examples of RLC series circuits
  - Practical examples of parallel circuits
  - Comparison of current limiting characteristics of inductors and resistors
- Selecting appropriate meter
  - Using manufacturers catalogues to select measurement equipment for a particular installation
  - Fault loop impedance of an A.C. Power system
  - Determining fault loop impedance using resistance and reactance values
  - Measuring fault loop impedance of typical circuits
  - Procedures for testing fault loop impedance

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Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Feedback will be in accordance with institutional policies

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role playing, case studies and presentations.

CAPSTONE EXPERIENCE DESCRIPTION

Students will use the skills and knowledge to design and install different types of A.C. circuits. Use measurement to determine electrical quantities and use known laws to calculate electrical quantities.

RESOURCES

- Lecturer:
- Materials, Tools, and equipment
- Measuring instruments: Wattmeter, Voltmeter, Ammeter

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	PREPARING WORKPLACE DOCUMENTATIONS AND TECHNICAL REPORTS (APPLIED COMMUNICATION II)
COURSE CODE:	COSEACM1201
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	COMMUNICATING EFFECTIVELY IN THE WORKPLACE
YEAR/SEM.:	YEAR 1, SEMESTER 2
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to communicate effectively in the workplace using workplace documentation and reports. It includes a detailed look at the communication process, examining the intricacies of technical writing and promotes critical thinking skills that will allow the individual to engage in informative discourse that would be beneficial to their field of expertise and by extension the wider society.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students will be able to express themselves lucidly in their specialized areas and the communication course will help them to master the art of written and utterances objectively. The course also aims at underscoring the value of good writing and speaking in general, which is based on a healthy attitude towards effective communication.

Upon successful completion of this course, the learner will be competent when they are able to:

1. Communicate clearly, concisely and correctly within the requirements of the environment and context;
2. Respond to written, spoken or visual messages in a manner that ensures effective communication;
3. Make independent choices and solve routine communication problems with keen attention to ethical practices
4. Demonstrate tolerance and temperance when interacting with others
5. Empathize and make informed decisions

UNIT I - USE ORGANIZATIONAL COMMUNICATION SYSTEMS 15 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

1.1. Explain the importance of ethical behaviour in communicating

1.2. Assess own role in workplace communication

1.3. Explain the importance of communication flow within an organization

1.4. Demonstrate sensitivity to diverse audience when communicating

1.5. Use Communication Systems and Procedures

1.6. Interpret Communication Policies

Content

To include but not limited to:

- Copyright /intellectual property (digital, print, audio)
- Use of company property for personal use (photocopier, printer, computer, phone, stationery, social media accounts, etc.)
- Collection, storage, retrieval and disposal of confidential information
- Interpersonal abuse (physical violence, sexual harassment, emotional abuse, abuse of one's position, racism, and sexism)
- External communication – purpose, advantages and disadvantages of (Networking, negotiating, sharing of ideas)

- Internal communication – purpose, advantages and disadvantages of (Hierarchy, downward flow, upward flow, lateral/horizontal communication, diagonal communication, grapevine/informal communication)
- The rights of individual/groups to religious, ethnic, political, and cultural beliefs and practices
- The rights of differently-abled individuals/groups in the workplace
- The effects of discrimination in the workplace (gender, age, education, social status, sexual orientation)
- The advantages and disadvantages of diversity in the workplace

UNIT II – PROFESSIONAL IMAGE 3 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

2.1. Define professional image

2.2. Justify the need for maintaining a professional image

2.3. Dress appropriately according to professional dress codes

2.4. Exercise good workplace etiquette

Content

To include but not limited to:

- Work place etiquette –(the opening of a door for somebody, waiting for someone to come out of an elevator before going in, social etiquette etc), managing your emotions
- Professionalism - Tattoos, adornments, inappropriate dressing, grooming, inappropriate conversation, conduct when representing the organization
- Personal Development

UNIT III – BUSINESS DOCUMENTS FOR EFFECTIVE COMMUNICATION IN THE WORKPLACE. 2 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

3.1. Produce quality written information

3.2. Complete commonly used business forms

3.3. Prepare reports

Content

To include but not limited to:

- Reports (accident, technical), letters (request, complaint, apology, job application), e-mails
- Forms, notices, schedules, logs used in the related industry

UNIT IV – CORRESPONDENCES FOR MEETINGS 6 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

4.1. Produce documents for business meetings

4.2. Conduct a business meeting

Content

To include but not limited to:

- Memo, agenda, minutes
- Action plan

UNIT V – ORAL COMMUNICATION 9 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

5.1. Conduct professional presentation

5.2. Communicate effectively

Content

To include but not limited to:

- Tone, intonation, pitch, rhythm, body language, attire, etc.
- Important elements of public speaking.
  - Audience analysis
  - Presentation purpose

- Language correctness
- Stage presence
- Proper use of stage & props

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Feedback will be in accordance with institutional policies

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role playing, case studies and presentations

RESOURCES

1. Required: Communicating Today: The Essentials Zeuschner, Raymond. (2003).California State University Pearson Education, Inc.
2. Critical Thinking and Everyday Argument, Verlinden, Jay wadsworth, (2005) Cengage learning

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	USING HVAC APPLICATIONS - I
COURSE CODE:	COSEHVC1201
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	USING HVAC FUNDAMENTALS PRINCIPLES
YEAR/SEM.:	YEAR 1, SEMESTER 2
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to install ducts, grilles, apply HVAC requirements in treating with air conditioning systems, hydronic systems heat pump systems.

LEARNER OUTCOMES/INSTRUCTIONAL OBJECTIVE

Upon completion of this course, students are competent when they are able to:

1. Select appropriate duct, grilles, for HVAC requirements
2. Apply theory of heat transfer and fluid flow in hydronic systems
3. Apply fundamentals of refrigeration as related to air conditioning and heat pump systems
4. Apply theory of gaseous fuel utilization

UNIT I – DUCTS AND GRILLES FOR HVAC REQUIREMENTS 12 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1. Interpret OHS requirement and other regulations
1.2. Select appropriate duct and grilles HVAC requirements
1.3. Determine equipment specifications
1.4. Test equipment
1.5. Use energy recovery devices
1.6. Balance ducts
1.7. Measurement of system quantities

Content

To include but not limited to:

- Relevant regulations, codes of practices OHS regulations
  - Determining and verifying equipment specifications:
  - Heating and cooling unit
  - Evaporative cooler and cooling tower
  - Energy recovery devices (including airflow and enthalpy changes)
  - Air conditioning distribution system
  - Heat pumps and spilt AC units
  - Duct balancing and measurement of system

UNIT II – IMPROVE EQUIPMENT OPERATIONAL EFFICIENCY 12 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1. Determine the benefits of efficient operation of equipment
2.2. Identify flow characteristics of pumps
2.3. Measure static pressure and velocity
2.4. Layout hydraulic heat and cooling loop piping
2.5. Improve operational efficiency of equipment

Content

To include but not limited to:

- Pumps
- Static pressure
- Velocity readings

- Head and cooling loop

UNIT III – COOLING AND HEATING LOADS 12 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1. Differentiate between heating and cooling loads

3.2. Use different methods to calculate cooling loads

3.3. Use different methods to calculate heating loads

3.4. Calculate percentile of eutectic solution

3.5. Explain the functions of eutectic solution

3.6. Determine freezing points

3.7. Handle LPG equipment

Content

To include but not limited to:

- Eutectic solution
- Calculating percentile
- Freezing points
- Manual method of cooling load
- Computer programme method of cooling load
- LPG heaters/stoves/ovens

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%

2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Feedback will be in accordance with institutional policies

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role playing, case studies and presentations

CAPSTONE EXPERIENCE DESCRIPTION

Students will be requires to test Duct System Refrigeration System, Air pressure, analyse existing HVAC system and prepare report.

RESOURCES

1. Lecturers
2. Tools equipment, LPG heaters, stove, oven, meters, split AC Unit

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	APPLYING THERMODYNAMICS
COURSE CODE:	COSEATD1101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 1, SEMESTER 2
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to apply the principles and practices of thermodynamics to address issues requiring solutions to thermodynamics and electro-technology problems and to solve problems in static and dynamic system.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon on completion of this course, students are competent when they are able to:

1. Apply thermodynamics laws and principles to develop solutions to electro technology related problems
2. Apply Laws and Principles of Thermodynamics
3. Analyse thermodynamic problems
4. Solve thermodynamics problems
5. Conduct testing of thermodynamics system

6. Prepare to apply thermodynamic laws and principles to develop solutions to electro technology related problems
7. Apply the laws of thermodynamics to develop solutions to electro technology problems

UNIT I – APPLY LAWS AND PRINCIPLES OF THERMODYNAMICS 7 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

1.1. Explain the applicability of thermodynamics
1.2. Explain the laws and principles of thermodynamics
1.3. Apply the laws and principles of thermodynamics
1.4. Explain types of gas law and their uses

Content

To include by not limited to:

- Laws and principles of thermodynamics:
  - Zeroth Law of Thermodynamics
  - The First Law of Thermodynamics
  - The Second Law of Thermodynamics
  - The Third Law of Thermodynamics
- Gas laws:
  - Boyles law
  - Charles's law
  - Gay-Lussac's law

UNIT II - ANALYSE THERMODYNAMIC PROBLEMS ? HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

2.1. Identify common thermodynamic problems
2.2. Solve common thermodynamic problems
2.3. Analyse thermodynamic problems
2.4. Conduct testing of thermodynamic systems

Content

To include but not limited to:

- Thermodynamic problems in electro technology systems:
  - Common thermodynamic problems
  - Identification of problems
  - Analysis of problems (using laws and principles of thermodynamics)
  - Recording problems (written and diagrammatic)
- Solving thermodynamic problems:
  - Equipment and testing devices
  - Application of laws and principles of thermodynamics to solve problems

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role playing, case studies and presentations.

CAPSTONE EXPERIENCE DESCRIPTION

None

RESOURCES

Lecturers, instructional materials, thermodynamic system, tools and equipment, appropriate materials, diagrams

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	PREPARING DRAWINGS (DRAFTING DESIGNS I)
COURSE CODE:	COSEDFT1101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	1
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 1, SEMESTER 2
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to communicate effectively in the engineering field using drafting skills. It is designed to equip students with basic graphic communication skills, to operate at the industry standard and so enable them to interpret designs of engineers. They will also be able to convey their own ideas graphically, using these skills in many ways; and at the level that it is accurately understood by the engineering team, and to a lesser extent by the end users of related products and services. Occupational Health and Safety (OHS) will be aligned to each component of the drawing process and the student will be guided on how OHS should be planned and designed for in the executing of the drafting process.

LEARNER OUTCOME AND INSTRUCTIONAL OBJECTIVE

Upon completion of this course, students are competent when they are able to:

1. Use drafting concepts and principles
2. Use drafting instruments
3. Work as part of the project design team

4. Interpret drafting instructions
5. Prepare drawings to Specifications

UNIT 1 – APPLICATION OF DRAWING PRINCIPLES (6 HOURS)

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1. Identify types of drawings
1.2. Classify types of drawings and explain their purpose
1.3. Identify drawing forms: units, formats, sheet sizes
1.4. Apply various types of drawing routines

Content

To include but not limited to:

- Types
- Purpose & classification
- Drawing forms: sheet size and format, metric, imperial, copy fold information
- Drawing routines: signatures, approvals, dates, numbers and numbering systems, design considerations/specifications, materials or component specifications, lists, titles, proprietary information, fasteners, representations, notes, charts and graphs, modifications and revision conventions

UNIT II – APPLYING SCIENCE, TECHNOLOGY, ENGINEERING AND MATH PRINCIPLES AND CONCEPTS (12 HOURS)

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1. Apply various concepts (STEM) to drawing activities
2.2. Identify various drafting documentation
2.3. Use line conventions and lettering on sectional, pictorial and engineering drawings

2.4. Use the appropriate measurements on various drawings

2.5. Insert various borders and blocks suitable for drawing type

2.6. Construct geometric shapes and reproduce given drawings

2.7. Reproduce drawings

Content

To include but not limited to:

- Fundamentals of drafting documentation including contents, version control, indexing and product identification (e.g. Logo, trademark, software warning plates)
- Line types and weights
- Delineation: line conventions and lettering; multi- and sectional view drawings; pictorial drawings, types and application of engineering drawings, conventional representations, microfilming; descriptive geometry and revolutions
- Measurements: types, forms, units, symbols, reading and transfer
- Basic drawing layout (e.g. borders and information blocks)
- Geometric construction principles
- Usage of reproducible drawings with mechanical pencils

UNIT III – AUXILIARY VIEWS (6 HOURS)

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1. Apply the principles, terms and conventions used in auxiliary views

3.2. Use both primary and secondary views construction

3.3. Draw auxiliary views of objects

Content

To include but not limited to:

- Principles, terms and conventions usage in auxiliary views
- Use and application of auxiliary views
- Primary auxiliary view construction
- Secondary auxiliary view construction

UNIT IV – APPLY DESCRIPTIVE GEOMETRY/REVOLUTIONS 6 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1. Apply principles, terms and conventions used in descriptive geometry/revolutions

4.2. Draw graphical solutions of points, lines and planes

4.3. Draw graphical solutions of intersections (e.g. lines, planes and solids)

4.4. Draw true lengths of lines, bearing and slope of lines

4.5. Draw graphic solution of solids

4.6. Perform drawings and constructions using the revolution method

Content

To include but not limited to:

- Use of principles, terms and conventions in descriptive geometry/revolutions
- Graphic solutions of points, lines and planes
- Graphic solutions of intersections (e.g. lines, planes, and solids)
- True length of lines, bearing, and slope of lines
- Graphic solutions of solids
- Drawings construction using the revolution method

UNIT V – APPLY SECTIONAL VIEWS/CONVENTIONS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

5.1. Apply the principles, terms, symbols and conventions of sectional views

5.2. Determine the use and application of sectional views, conventional breaks and cutting planes

5.3. Draw standard sectional views

5.4. Sketch symbols used to represent different materials

Content

To include but not limited to:

- Principles, terms, symbols and conventions of sectional views
- Use and application of sectional views
- Drawing standard sectional views

- Use of conventional breaks
- Symbols used to represent different materials
- Use of cutting plans

UNIT VI – DIMENSIONING/SIZE DESCRIPTION AND TOLERANCE AS APPLIED TO DRAFTING ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

6.1 Apply the principles, terms, symbols and conventions used in dimensioning and for tolerances

6.2 Insert appropriate dimensions on relevant drawings

6.3 Apply different dimensioning techniques

6.4 Identify the various tolerances and apply them to the relevant drawings

6.5 Use formula for positional tolerances

6.6 Use dimensioning verification requirements

6.7 Use form, orientation, profile and run out

Content

- Principles, terms, symbols and conventions used in dimensioning and for tolerance
- Terms, conventions and codes related to dimensioning
- Dimensioning drawing construction using international standards
- Types and usage techniques of dimensioning
- Application of dimensioning to object drawings
- Geometric dimensioning and tolerances
- Lines used in dimension drawings construction
- Dimensioning practices applications
- Dual dimensioning
- Tolerance applications
- Dimensioning verification requirements
- Formulas for positional tolerances
- Form, orientation, profile and run out

UNIT VII – DEVELOPMENT OF LAYOUTS FOR VARIOUS SHAPED OBJECTS

? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

7.1. Apply the principles and concepts of development layouts of various shaped objects

7.2. Identify terms, conventions and codes related to surface developments

7.3. Use industry standards of surface development use

7.4. Construct models for checking accuracy

7.5. Use rules associated with surface developments to produce stretch outs

Content

To include but not limited to:

- Principals and concepts of development layouts of various shaped objects
- Terms, conventions and codes related to surface developments
- Surface developments use in industry standards
- Basic three dimensional geometric shapes visualization in a two dimensional plane
- Cut out and construct models for checking accuracy
- Rules of surface developments to produce stretch outs

UNIT VIII – LAYOUT DRAWINGS PRODUCTION TO INDUSTRY STANDARDS

? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

8.1. Use the principles, concepts and applications of layout drawings

8.2. Use terms conventions and codes related to layout drawings

8.3. Differentiate layout drawing types

8.4. Apply the rules for layout drawings

8.5. Interpret the concepts of units of measurement usage related to layout drawings

Content

To include but not limited to:

- Principals, concepts and applications of layout drawings

- Terms, conventions and codes related to layout drawings
- Layout drawings types and differences
- Rules for layout drawings
- Concepts of units of measurement usage related to layout drawings

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

INSTRUCTIONAL METHODS

- Practical Demonstrations

RESOURCES

- Lecturer.
- Drawings instruments, sample drawings, model of different sectional views, video, drawing papers

COURSE OUTLINES

YEAR 2

SEMESTER 3

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	USING HVAC APPLICATIONS II
COURSE CODE:	COSEHVC2301
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	APPLYING RENEWABLE ENERGY PRINCIPLES AND PRACTICES (RENEWABLE ENERGY I)
YEAR/SEM.:	YEAR 2, SEMESTER 3
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to install ducts, grilles, apply HVAC requirements in treating with air conditioning systems, hydronic systems heat pump systems.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students are competent when they are able to:

1. Select appropriate duct, grilles, for HVAC requirements
2. Apply theory of heat transfer and fluid flow in hydronic systems
3. Apply fundamentals of refrigeration as related to air conditioning and heat pump systems
4. Apply theory of gaseous fuel utilization

UNIT I – HAVC INSTALLATION SPECIFICATIONS 8 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1. Interpret OHS regulations

1.2. Interpret codes of practice that govern the installation HAVC equipment.

1.3. Apply procedure to determine HAVA Installation Specification

1.4. Identify and select components

1.5. Follow safety procedure

Content

To include but not limited to:

- Relevant regulations, codes of practice and Occupational Health and Safety Requirements
- Determining and verifying equipment specifications:
  - Heating and cooling unit
  - LPG heaters/stoves/ovens
  - Evaporative cooler and cooling tower
  - Energy recovery devices (including airflow and enthalpy changes)
  - Air conditioning distribution system
  - Heat pumps and spilt AC units
  - Duct balancing and measurement of system

UNIT II – INSTALLATION OF HVAC EQUIPMENT 8 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1. Read and interpret layout diagrams

2.2. Select trolls, materials and equipment for use

2.3. Prepare location for installation

2.4. Install HVAC equipment to required specification

2.5. Inspect and test instillation

Content

To include but not limited to:

- Heating and cooling unit
- LPG heaters/stoves/ovens
- Evaporative cooler and cooling tower
- Energy recovery devices (including airflow and enthalpy changes)
- Air conditioning distribution system
- Heat pumps and spilt AC units
- Duct balancing and measurement of system

UNIT III – TROUBLESHOOTING HVAC EQUIPMENT 8 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1. Explain the purpose of troubleshooting equipment

3.2. Follow procedures for troubleshooting

3.3. Select appropriate tools to troubleshoot HVAC equipment

3.4. Troubleshoot HVAC equipment

3.5. Record findings from troubleshooting activities

3.6. Execute corrective action as necessary

Content

To include but not limited to:

- Heating and cooling unit
- LPG heaters/stoves/ovens
- Evaporative cooler and cooling tower
- Energy recovery devices (including airflow and enthalpy changes)
- Air conditioning distribution system
- Heat pumps and spilt AC units
- Duct balancing and measurement of system

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

INSTRUCTIONAL METHODS

- Practical Demonstrations
- Lectures
- Discussions

- Role playing and presentations
- Case studies

RESOURCES

- Lecturer.
- Drawings instruments, sample drawings, model of different sectional views, video, drawing papers
- Tools/Equipment,
- LDG heaters
- Stove, oven, meters
- Split AC Unit

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	WORKING WITH ELECTRONIC DEVICES AND RENEWABLE ENERGY SYSTEMS
COURSE CODE:	COSEREN2201
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	APPLYING RENEWABLE ENERGY PRINCIPLES AND PRACTICES (RENEWABLE ENERGY I)
YEAR/SEM.:	YEAR 2, SEMESTER 3
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to design electronic circuits, install electronic circuits, reprogram circuits, detect and correct faults, as well as complying with registration and regulations governing the sector. Emphasis will be placed on PN Junction semiconductor as switch and amplifier.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students are competent when they are able to:

5. Apply OHS regulations to work procedure
6. Apply legislation relate to renewable energy
7. Apply electronics systems/techniques to wire circuits
8. Design electric system

9. Install electronic circuits
10. Identify and select electronic components
11. Detect faults in electronic circuits
12. Correct faults in electronic circuits
13. Measure electronic qualities in electronic circuits
14. Design different circuits to specifications and in accordance with relevant regulations, codes of practice and OHS requirements
15. Select appropriate electronic components in accordance with relevant regulations, codes of practice and OHS requirements
16. Use suitable repair methods to evaluate and correct circuit performance

UNIT I – USE BINARY NUMBER SYSTEM 8 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Explain the use of Binary Number System

1.2 Convert numbering systems

1.3 Use binary System to design logic gates

1.4 Develop tables of Specification

Content

To include but not limited to:

- Numbering systems
  - Hexadecimal Numbering System
  - Binary numbering System
  - Digital versus Analog
  - Decimal to Binary Conversion
  - Octal numbering system
- Truth tables

UNIT II – CONSTRUCT LOGIC GATES 15 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

a. Explain the functions of Logic Gates
b. Differentiable between AND OR Gates
c. Explain the operation and use of AND gates and OR gates
d. Draw timing diagrams for logic gates
e. Construct truth tales for two / three inputs
f. Apply troubleshooting techniques
g. Design gates using transistor and / or Integrated Circuits- IC's

Content

To include but not limited to:

- Trouble Shooting Techniques
  - and gate/ truth tale
  - or gate/truth table
  - nand gate/truth table
  - nor gate/ truth table

UNIT III – USING DESIGN PRINCIPLES 20 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Explain the functions or rectifiers

3.2 Interpret circuit designs

3.3 Design circuits for various practical applications

3.4 Produce rectifier circuits for various practical applications

3.5 Diagnose faults in components and circuits

3.6 Remove faulty components and replace components

3.7 Identify and select components for circuits

3.8 Use OHS regulations and related regulations

3.9 Test rectifiers circuits

Content

To include but not limited to:

- Design & Produce circuits
  - Rectifiers (capacitors, transformer, resistor, coil – purpose, functions, relationship among)
  - Half-wave, full-wave, bridge (purpose, functions, relationship among, curve)
- Troubleshooting: testing diodes & transistors to determine faults
- OHS policies and regulations

UNIT IV – Install Transistors 15 Hours

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1 Explains the functions of transistors

4.2 Identify types of transistor and their characteristics

4.3 Design common configuration transistors

4.4 Identify transistors rating

4.5 Test transistors

4.6 Troubleshoot faults in circuit

4.7 Correct faults in circuits

Content

To include but not limited to:

- Design
  - Emitter, Base and Collector legs (identify, purpose, and function)
  - Common Base, Common Emitter, Common Collector circuits
- Reading legs to determine faults (resistance)
- Determining faults in the circuits (voltage, resistance)

UNIT V – INSTALL OPERATIONAL AMPLIFIERS 15 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

5.1 Identify types of amplifiers

5.2 Explain the operation of amplifiers

5.3 Explain the importance of amplifiers

5.4 Design and simulate amplifiers using 555 Timer LM324

5.5 Identify feedback curves

5.6 Explain the difference between Digital and Analog circuits

5.7 Install amplifiers

Content

To include but not limited to:

- The importance of Operational Amplifiers (Differential Amp, Inverting Amp, Non-Inverting Amp
- Design & Simulate
  - 555 Timer LM324 (purpose, functions, relationship between)
- Response of curves
- The difference between digital and analog (curve, advantages and disadvantages of each)

UNIT VI – INSTALL FILTER CIRCUITS 15 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

6.1 Explain functions of filter circuits

6.2 Identify the characteristics of filter circuits

6.3 Design active filters

6.4 Follow procedures for protection of components

6.5 Install filter circuits

6.6 Test designed circuits to ensure performance to specification

6.7 Apply OHS policies and related regulations

6.8 Measure electrical quantities

Content

To include but not limited to:

- Design active filters
  - Low pass, high pass, band pass (differentiate among them, purpose, functions, relationship between)
- OHS policies and regulations
- Measuring electric quantities

UNIT VII - MOSFETS AND EMOSFETS APPLICATIONS 6 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

7.1 Explain the functions of MOSFETS and EMOSFETS

7.2 Differentiate between MOSFETS and EMOSFETS

7.3 Explain the operations of depletion modes

7.4 Use typical drain curve

7.5 Construction graphs using formulas

Content

To include but not limited to:

- Depletion modes
- MOSFET & EMOSFET – (operations of, construction, different parts, schematic symbols)
- Formulas, constructing graphs from formulae

UNIT VIII - USE THYRISTORS APPLICATION 8 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

8.1 Explain the four layer diode performance

8.2 Determine how SCR operates in circuits

8.3 Explain how the Diac and Triac work in circuits

8.4 Troubleshoot circuit for faults

Content

To include but not limited to:

- Four layer Diode
- Closing and Opening Latch
- 3 SCR
- Troubleshooting

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Feedback will be in accordance with institutional policies

INSTRUCTIONAL METHODS

Video, Handout and practical demonstration, think pair share

CAPSTONE EXPERIENCE DESCRIPTION

Design different circuits to specifications and in accordance with relevant regulations, codes of practice and OHS requirements

RESOURCES

1. Electronics Fundamentals circuits, Devices, and Applications 8th Edition, Thomas L .Floyd& David M. Buchla
2. Electronic Principles 5th Edition Albert Paul Malvino, PHD.,EE. McGraw –Hill
3. www.technologystudent.com
4. Digital Electronics- a practical approach 4th Edition , William Kleitz
5. Digital Electronics- 3rd Edition , Roger Tokheim
6. Equipment: Inventers, Battery monitors, charge controllers.

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	USING AUTOCAD APPLICATIONS AND DESIGN (DRAFTING II)
COURSE CODE:	COSEDFT2201
COURSE HOURS:	45 HOURS (Practical)
CREDIT VALUE:	1
PREREQUISITES:	PREPARING DRAWINGS (DRAFTING DESIGNS I)
YEAR/SEM.:	YEAR 2, SEMESTER 3
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to use AutoCAD Application to create advanced drawings. The course augments the principles learnt in Drafting, with focus on complex engineering assembly gadgets, the relevant machining finishes; fabrication drawings with the relevant welding symbols, and pattern drawings for items that are to be casted. Students will also be able to save, store and retrieve these files to use on future projects, which may require modification in some cases.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students are competent when they are able to:

1. Use AutoCAD principles and design
2. Prepare drawings using AutoCAD Software
3. Modify existing drawings to produce new drawings

4. Interpret drawings instructions
5. Explain the role of computers in drafting
6. Use the software to produce simple drawings
7. Apply engineering drawing in the field of renewable energy

8. Determine how emerging technologies in AutoCAD impacts the need for continued development of a professional in the renewable energy field

UNIT I: PRODUCE BASIC PRODUCTION FABRICATION DRAWINGS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Use principles, terms, symbols codes and conventions used in production fabrication drawings

1.2 Create different types of detailed and assembly drawings

1.3 Apply appropriate techniques of detailed and assembly drawings

1.4 Apply specification and industry standards to produce drawings

Content

To include but not limited to:

- Principles, terms, symbols, codes and conventions usage in production fabrication drawings
- Types and usage techniques of detailed and assembly drawings
  - Production fabrication drawings techniques

UNIT II: DETAILING DRAWING ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

a. Apply the principles, concepts and applications of detailing
b. Use the terms, conventions and codes related to detailing;
c. Apply the various detailing types, application and selection;
d. Identify the different fabrication processes and the identification of machine parts;
e. Use rules for drawing machine part details;

f. Use concepts of units of measurement usage related to detailing;

g. Use properties and relationships of triangles and circles to produce geometric shapes related to detailing

Content

To include but not limited to:

- Principles, concepts and applications of detailing
- Terms, conventions and codes related to detailing
- Detailing types, application and selection
- Different fabrication processes and identification of machine parts
- Rules for drawing machine part details
- Concepts of units of measurement usage related to detailing
- Application of properties and relationships of triangles and circles to solve geometric shapes related to detailing

UNIT III– ASSEMBLY DRAWINGS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Use principles, concepts and applications of assembly drawings

3.2 Use terms, conventions and codes related to assembly drawings

3.3 Distinguish between different types of assembly

3.4 Use processes and identification of machine part assemblies

3.5 Use rules for drawing assembly drawings

3.6 Use concepts of units of measurement.

3.7 Use appropriate assembly drawings for engineering components

3.8 Produce machine assembly drawing - detailed drawings

3.9 Create drawings for welded component parts

3.10 Develop parts list development

3.11 Produce file and/or drawing for CAD/CAM applications

3.12 Create drawings for Gears and Cams

3.13 Explain the use and application for threads and fasteners (e.g. Bolts, pins, and keys)

3.14 Produce drawings for metal bending and fabricating

3.15 Apply standard fits, finishes, and tolerances to a machine drawing

3.16 Follow manufacturing processes (e.g. Machine, metal forming, and CNC)in assembly drawings

Content

To include but not limited to:

- Principles, concepts and applications of assembly drawings; terms, conventions and codes related to assembly drawings; different assembly
  - Processes and identification of machine part assemblies; rules for drawing assembly drawings; concepts of units of measurement
- Usage related to assembly drawings; application of properties and relationships of triangles and circles to solve geometric shapes related to assembly drawings
- Machine assembly drawing production
- Detailed drawings
- Drawings for welded component parts
- Parts list (e.g. Balloons) development
- File and/or drawing for CAD/CAM applications
- Gears drawings
- Cams drawings
- Threads and fasteners (e.g. Bolts, pins, and keys) use and applications
- Drawings for metal bending and fabricating
- Standard fits, finishes, and tolerances to a machine drawing applications
- Manufacturing processes (e.g. Machine, metal forming, and CNC)

UNIT IV – DEVELOP PATTERN ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1 Use principles, concepts and purpose of pattern development

4.2 Use terms, conventions and codes related to pattern development

4.3 Apply types and usage techniques of pattern development to related drawings

4.4 Apply pattern development and intersection techniques to related drawings

4.5 Use intersections of geometric surfaces development techniques and applications

4.6 Use flat surfaces development techniques and applications

4.7 Construct patterns from intersection specifications

Content

To include but not limited to:

- Principles, concepts and purpose of pattern development
- Terms, conventions and codes related to pattern development
- Types and usage techniques of pattern development and related drawings
- Application of pattern development and intersection techniques
- Intersections of geometric surfaces development techniques and applications
- Flat surfaces development techniques and applications
- Construct of objects from the intersection

UNIT V – DEVELOP MAPS, PROFILES DESIGNS AND PRODUCTION ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

5.1 Use principles, concepts and applications of maps and profiles design and production

5.2 Use terms, conventions and codes related to maps and profiles design and production

5.3 Identify maps and profiles design, production types and uses

5.4 Use rules for cartography

5.5 Select components and transit usage

5.6 Use symbols and applications for topography

5.7 Use properties and relationships of triangles to solve problems of mathematic nature

Content

To include but not limited to:

- Principals, concepts and applications of maps and profiles design and production
- Terms, conventions and codes related to maps and profiles design and production
- Maps and profiles design and production types and uses

- Rules for cartography
- Components selection and transit usage
- Symbols usage and applications for topography
- Application of properties and relationships of triangles to solve geometric problems; trigonometric relations to solve right triangles, law of sines and cosines to solve triangles

UNIT VI – PREPARE BASIC PIPE/PLUMBING DRAWINGS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

6.1 Use principles, purpose, terms and conventions usage in pipe/plumbing drawings

6.2 Identify applicable codes, symbols and abbreviations

6.3 Use piping symbols, fittings, fixtures, and valves

6.4 Identify types of piping systems and usage techniques in pipe drawings

6.5 Explain the principles of pneumatics and hydraulics

6.6 Produce pneumatics and hydraulic schematics drawings

6.7 Produce Plumbing schematics drawings

6.8 Apply techniques and applications in creating drawings of piping and systems

Content

To include but not limited to:

- Principles, purpose, terms and conventions usage in pipe/plumbing drawings
- Applicable codes, symbols and abbreviations
- Piping symbols, fittings, fixtures, and valves
- Types of piping systems and usage techniques in pipe drawings
- Principles of pneumatics and hydraulics
- Pneumatics and hydraulic schematics production
- Plumbing schematics production
- Techniques and applications in creating drawings of piping symbols and systems

UNIT VII: PRODUCTION BASIC STRUCTURAL STEEL, WELDING AND SHEET METAL DRAWINGS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1. Use principles, terms and conventions usage in structural steel, welding and sheet metal drawings

1.2. Classify major structural and welding components

1.3. Use rules and symbols used in structural and welding drawings

1.4. Identify structural steel shapes and steel-framing materials

1.5. Produce details and assembly drawings f or with bill of materials/bills of quantities

1.6. Produce steel frame plan drawings

1.7. Apply different types/techniques of structural and welding drawings

1.8. Use techniques and applications to create structural drawings using measuring, labeling, and symbol procedures

1.9. Utilize techniques and applications in drafting the processes for joining metal and standard symbols for welding

1.10. Use appropriate techniques and applications in creating welding drawings complete with weld symbols

1.11. Apply sheet metal layout methods and procedures

1.12. Create Representative sheet metal drawings

1.13. Produce Sheet metal drawings for CAD/CAM applications

Content

To include but not limited to:

- Principles, terms and conventions usage in structural steel, welding and sheet metal drawings
- Classification of major structural and welding components
- Rules and symbols used in structural and welding drawings
- Structural steel shapes
- Steel-framing materials

- Detail and assembly drawings (including beam connections) with bill of materials
- Steel frame plan drawings production

- Types and usage techniques of structural and welding drawings
- Techniques and applications in creating structural drawings using measuring, labeling, and symbol procedures
- Techniques and applications used in drafting the processes for joining metal and standard symbols for welding
- Techniques and applications in creating welding drawings complete with weld symbols
- Sheet metal layout methods and procedures
- Representative sheet metal drawings
- Sheet metal drawings for CAD/CAM applications

UNIT VIII – INK OVERLAY DRAWINGS PRODUCTION ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

8.1 Use the principles, concepts and applications of ink overlay drawings production

8.2 Use terms, conventions and codes related to ink production

8.3 Produce drawing specifications, identification and analysis

8.4 Use rapid graph equipment usage procedures

8.5 Produce Ink overlay drawings

Content

To include but not limited to:

- Principals, concepts and applications of ink overlay drawings production
- Terms, conventions and codes related to ink production
- Drawing specifications identification and analysis
- Rapid graph equipment usage procedures

UNIT IX – DRAWINGS REPRODUCTIONS TO INDUSTRY STANDARDS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

9.1 Use principles, concepts and applications of drawing reproductions

9.2 Use terms, conventions and codes related to processes and drawing reproductions

9.3 Use rules for reproducing drawings

9.4 Identify the various machines in use and the appropriate selection in the reproduction process

9.5 Produce drawings to specification

Content

To include but not limited to:

- Principals, concepts and applications of drawing reproductions
- Terms, conventions and codes related to processes related to drawing reproductions
- Rules for reproducing drawings
- Various machines usage and selection in the reproduction process

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

CAPSTONE EXPERIENCE DESCRIPTION

Students will be required to designed and produce drawings using AutoCAD software for a Renewable Energy Instillation Project

RESOURCES LECTURERS

AutoCAD Software, Models, sample drawings, tools and equipment

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	DESIGNING AND INSTALLING RENEWABLE ENERGY SYSTEMS I
COURSE CODE:	COSERES2301
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	ELECTRONIC DEVICES AND RENEWABLE ENERGY SYSTEMS
YEAR/SEM.:	YEAR 2, SEMESTER 3
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to design, install, maintain and quality control renewable energy systems, namely thermal, wind, micro-hydro, and photovoltaic systems. In addition students will learn how to perform preparatory activities, research and collect data, design modifications, prepare costing and budgets, use required regulations, prepare reports using Standard English, manage related documents and documentation, and obtain design approval.

LEARNING OUTCOMES/INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students are competent when they are able to:

1. Contrast and compare the different types of renewable energy systems
2. Interpret OHS regulations and related regulations governing the renewable energy sector
3. Work with thermal heating system
4. Design and size system
5. Work with hydraulic circuits
6. Work with micro-hydro system
7. Work with photo voltage system
8. Edit system design
9. Carry out quality control system

UNIT I: RENEWABLE THERMAL HEATING SYSTEMS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Explain the functions of the thermal heating system

1.2 Interpret codes of practice for thermal heating system

1.3 Relevant OHS regulations

1.4 Identify type of renewable thermal heating systems

1.5 Design and size renewable thermal heating systems

1.6 Work on commercial water heaters

1.7 Work on domestic solar water heaters

1.8 Apply safety and quality control procedures

Content

To include but not limited to:

- Relevant regulations,
  - Codes of practice
  - OHS regulations

- Types of renewable thermal heating systems:
  - Commercial solar hot water heaters
  - Domestic solar water heaters
  - Pool solar hot water heaters

UNIT II: DESIGN AND SIZING SYSTEMS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1 Explain the functions of designing and sizing systems

2.2 Follow procedures to design and sizing systems

2.3 Design renewable thermal heating systems

2.4 Size renewable thermal heating systems

2.5 Explain the characteristics of hydraulic circuits

2.6 Apply STEM in designing and sizing system

Content

To include but not limited to:

- Relevant science, technology, engineering and mathematical principles:
  - Heat transfer (modes, conduction, convection, radiation, combined conduction and convection, types of heat exchanges)
  - Combustion (the combustion process, fuels, air/fuel ration, emissions and pollutants, combustion equations, combustion products)
  - Steam (importance, steam/water properties, temperature, generation, safety devices and controls, steam plant, heat transfer rates, steam throttling and flash steam)
  - Daily irradiation
  - Heat system technologies (types, application, operating parameters, component parameters and configuration, system performance requirements)
  - Use refrigeration/heat pump (vapour compression cycle, types of refrigerants, ideal and actual vapour compression cycles, energy balance and heat transfer, Carnot Principle)

- Providing energy balance (heat transfer mechanisms, reducing heat losses from collector, providing energy balance)
- Solar collector use and performance (factors that affect selection of materials, features of collectors, tests for collector construction, tests for thermal performance)
- Hydraulic circuits (function and components, types and size components, safety
- Requirements, requirements to balance flow, water and energy conservation, types and level of insulation)
- Considerations
- Design alteration

UNIT III - PLAN AND MANAGE PROJECTS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Develop plans and schedules

3.2 Explain the term commissioning

3.3 Explain the development of project for installation and commissioning

3.4 Install and commission renewable thermal heating system

3.5 Apply various methods to install and commission systems

3.6 Perform servicing and maintenance of renewable thermal heating systems

3.7 Tart System

3.8 Perform site survey for renewable thermal heating systems

3.9 Prepare reports relate to projects managed in Standard English

Content

To include but not limited to:

- Development and preparation of project for installation and commissioning:
- Tasks and activities involved in installation and commissioning of system
- Work breakdown planning
- Considerations
- Responding to unplanned events
- Installation and commissioning of renewable thermal heating system:

- Methods
- Technique
- Tests
- Conducting customer walk-through

• Servicing and maintenance of renewable thermal heating systems:

- Job safety analysis and implementation
- Scheduled and unscheduled servicing and maintenance
- Solving mechanical and electrical problems

• Site survey:

- Declination angle, reflectance, sunshine hours, extra-terrestrial irradiation
- Energy efficiency techniques relevant for domestic dwelling and commercial premises to reduce the electrical energy demand
- Energy efficient initiatives that could be implemented by the site owner
- Estimation of the solar resource for the site

UNIT IV - DESIGN AND INSTALL PHOTOVOLTAIC SYSTEM ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

Explain the function of a photovoltaic system

Identify characteristic photovoltaic system

Explain the basic components of a photovoltaic system

Identify and select types of batteries used in photovoltaic systems

Identify and select the types of inverters used in photovoltaic systems

Content

• Inverter Characteristics encompassing:

- The characteristics which distinguish inverters suitable for photovoltaic array application from standard inverters
- The six (6) essential inverter specifications

• PV System Operation encompassing:

- operation of PV systems including synchronisation, safety feature, power flow control, passive and active anti-islanding, and metered energy for systems
- PV inverter selection encompassing:
- major installation requirements for all system components which will ensure correct operation, long life, safety and ease of maintenance consistent with local standards and
- relevant OH&S guidelines
- typical installation configurations for PV connection of energy systems via inverters
- the function and operation of a "PV protection device" as specified in local standards
- installation requirements for PV systems
- labelling and signage requirements for switchboards supplied with power from PV inverters, as set out in local standards
- the additional requirements for UPS systems as specified in local standards
- Design of a photovoltaic system
- Use of site survey and design brief
- Selecting system components
- Considerations including:
- Safety
- Functionality
- Budget
- Alternative arrangements
- Environmental impact of design
- System costing:
- Major costs to be considered in the life cycle costing method
- External costs that might impact on the cost effectiveness of a photovoltaic system
- Most cost effective of a number of options on the basis of life cycle costing analysis
- Design techniques

UNIT V – DESIGN AND INSTALL WIND ENERGY SYSTEM ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

5.1 Explain the importance of wind energy

5.2 Determine appropriate siting of wind energy

5.3 Apply the relevant local regulations, codes of practice and Occupational Health and Safety requirements

5.4 Evaluate the wind energy conversion systems

5.5 Design wind energy conversion system using design techniques

5.6 Install wind energy system

5.7 Set up quality control

5.8 Identify feature of atmospheric boundary lawyer

5.9 Use site survey and design brief

5.10 Evaluate environment impact of design/installations

5.11 Prepare costing and budget related to design/instillation

5.12 Perform quality control and monitory of systems

5.13 Prepare required reports and documentations

5.14 Take wind speed data measurements

Content

To include but not limited to

- Quality controls
- Approval of Designs:
  - Presentation of design to clients
  - Negotiation of alterations
- Relevant local regulations, codes of practice and Occupational Health and Safety requirements
- Wind energy conversion systems
  - Components
  - Characteristics
  - Operational principles
- Science, technology, engineering and mathematics principles and techniques
    - Wind characteristics encompassing:

- Definition of the terms: weather charts, isobars, fronts and troughs, cyclone and anti-cyclone, atmospheric boundary layer, geotropic wind, gradient wind, wind shear, wind rose
- Major global wind circulations and the formation of major wind flows over your continent

• Major features of the atmospheric boundary layer including:
  - Variation of wind speed with height according to logarithmic and power laws, effects of surface roughness
  - Atmospheric stability and temperature inversions turbulence
  - Major local winds including: trade winds, sea and land breezes, katabolic and anabatic winds
  - Likely effects on the major local winds from local topography, surface roughness, isolated barriers and temperature inversions
  - Typical diurnal, monthly and seasonal patterns of winds over the local area
  - The formation and likely effects of extreme winds and wind shear
• Wind speed data measurement and analysis encompassing:
  - Definition of the terms: porosity, internal boundary layer, speed-up factor,
  - Temperature inversion factor, wind speed frequency distribution, lull period, calms
  - Interpretation of local and regional wind speed and direction data such as local records (E.g. Meteorological Bureau data), ecological indicators and wind speed/energy maps
  - Wind speed and direction using data logging anemometers
  - Manufacturer's calibration curves for anemometers to correct recorded data
  - Calculation at a site, monthly and yearly average wind speed and wind power density from existing, nearby data or on-site measurements, using appropriate software
  - Estimation of the wind speed at a WECS tower of suitable height and location given: wind speed data recorded at two or more elevations at the site, and wind speed data recorded at one elevation and appropriate surface roughness, temperature inversion and speed-up factors at the site

- Design of wind energy conversion system:
    - Use of site survey and design brief
    - Selecting system components
    - Considerations including:
    - Safety
    - Functionality
    - Budget
    - Alternative arrangements
    - Environmental impact of design
- System costing encompassing:
    - Major costs to be considered in the life cycle costing method
    - External costs that might impact on the cost effectiveness of a wind energy conversion system
    - Most cost effective of a number of options on the basis of life cycle costing analysis
- Design techniques/ Methods
- Approval of design
    - Presentation of design to clients
    - Negotiation of alterations

UNIT VI: DESIGN AND INSTALL MICRO-HYDRO SYSTEM (M.H.S) ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

6.1 Explain the importance of micro-hydro system

6.2 Apply the relevant local regulations, codes of practice and Occupational Health and Safety requirements for the micro-hydro system

6.3 Evaluate the types of micro-hydro system

6.4 Design micro-hydro system:

6.5 Install and maintain micro-hydro systems

6.6 Prepare costing and budget

6.7 Perform quality control and monitoring

6.8 Conduct site-evaluations and prepare report

Content

To include but not limited to:

- MHS systems
  - Components
  - Characteristics
  - Operational principles
- Science, technology, engineering and mathematical principles and techniques
  - Site evaluation:
  - Definition of the terms: potential and kinetic energy, micro-hydro system, gross head, net head, flow rate
  - Available head at a site using a dumpy level or theodolite, altimeter, pressure gauge and contour maps
  - The accuracy, advantages and disadvantages of each method for flow and head assessment
  - The flow rate of a given site using each of the following methods - catchment area calculations, water diversion to fill a container, stream velocity/area measurement and/or weir construction method
  - Advantages and disadvantages of each method of head and flow measurement with particular reference to their accuracy
  - Long term usable flow rate from long term stream flow if available, taking into account environmental considerations
  - Effects of seasonal variation using long term weather data
  - Typical daily and seasonal energy consumption profile at a given site
  - Effect of the energy demand profiles both daily and seasonally at the site on the system sizing
  - Government regulatory requirements such as those covered under environmental or water resource legislation
  - Environmental constraints at a site including minimum stream flow rates, ecological impacts, visual and noise impacts

- Design of micro-hydro system:
    - Use of site survey and design brief
    - Selecting system components
    - Considerations including:
    - Safety
    - Functionality
    - Budget
    - Alternative arrangements
    - Environmental impact of MHS and appropriate measures to minimize these impacts
- System costing encompassing:
    - Major costs to be considered in the life cycle costing method
    - External costs that might impact on the cost effectiveness of a MHS
    - Most cost effective of a number of options on the basis of life cycle costing analysis
- Design techniques
    - Suitable MHS characteristics to suit site load, hydraulic head and stream flow rate characteristics and a suitable type of commercially available MHS
    - Frictional losses in delivery pipes using manufacturer's data
    - Optimising the position of the MHS and size of the MHS
    - Suitable balance of system components including delivery pipe and fittings, transmission cable and voltage, voltage and frequency regulation, battery storage type and capacity, battery charger, inverter, back-up generator, and load dump
- Micro-hydro systems installation and maintenance processes encompassing:
    - Appropriate methods, using appropriate safety procedures for: dam or weir construction; watercourse construction and/or penstock installation; turbine installation
    - Appropriate installation, commissioning, fault diagnosis and rectification procedures and maintenance methods using appropriate safety procedures
    - Maintenance schedule for the system

- Safety procedures for the installation, commissioning, fault diagnosis and maintenance of system components

- Quality controls Methods
- Approval of Design
  - Presentation of design to clients
  - Negotiation of alterations

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Feedback will be in accordance with institutional policies

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role plays project and presentations and site visits.

CAPSTONE EXPERIENCE DESCRIPTION

Students will be required to conduct research on the systems and prepare designs specification for a particular system, develop budgets and installation implementation plans and quality control systems procedure.

RESOURCES

Lecturers, Training materials, tools and equipment, drawing and models

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	APPYLING ENERGY SYSTEMS CONTROLS
COURSE CODE:	COSEESC2101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 2, SEMESTER 3
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to use control devices and instrumentations, take physical measurements, solve pressure measurement and use regulations governing the professional practices in the sector.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students are competent when they are to:

1. Handle control devices
2. Use measuring instrument
3. Principles and concepts
4. Use tools and equipment
5. P.C. Programming
6. Use programming timers

UNIT I – USE CONTROL DEVICES ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Explain the functions of control devices

1.2 Explain relevant OHS regulations system

1.3 Use codes of practices for energy control system

1.4 Select control devices used in the energy control system

1.5 Operate control devices used in the energy control system

Content

To include but not limited to:

- Relevant regulations, codes of practice and Occupational Health and Safety requirements
- Science, technology, engineering and mathematical principles and concepts:
- General pressure principles
- Definition of key terms and concepts (pressure, specific gravity, density)
- Basic signal conditioning principles
- Dead band and set point
- Pressure measuring devices, calibrators
- Electronic types of pressure sensors -- explain the function/operation of electric & pneumatic transducers
- Basic signal conditioning
- Devices
- Thermocouple devices
- Control devices:
- Resistance thermometry, temperature coefficients
- Solar differential temperature controller technologies
- Solar hot water system controls
- Infrared temperature measurement
- Current measurement for ac current and for battery ah metering
- Use and operating principles of co2 sensors

- Common units of pressure
- Relationships among gauge, vacuum, & absolute pressures
- Factors affecting liquid and gas pressures
- Principles of pressure gauges and manometers
- Applications of pressure sensors, and switches
- Operation of pressure sensors and switches
- Principle of operation of a co2 sensor sensing element
- Operation of T.T.Ds , thermistors and lm35 temperature sensors
- Operation of solar differential temperature controllers and system sensors

UNIT II: USE MEASURING INSTRUMENT ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1 Explain the functions of measuring instruments

2.2 Identify types of measuring instruments

2.3 Identify the type of hazards associated with use of measuring instruments

2.4 Use tools for physical measurements

2.5 Use testing and measuring methods/techniques

2.6 Prepare instruments for various types of measurements

2.7 Interpret readings and measurements

2.8 Prepare reports and related documents

2.9 Identify hazards

Content

To include but not limited to:

- Hazards:
  - Types
  - Safety controls
- Preparing to select and analyse instruments for physical measurements:
  - Scope of work
  - OH&S risk control

- Consultations
- Sourcing materials

• Tools, equipment and testing devices
- Functions
- Preparation
- Use
- Care
- Maintenance

• Test and measurement
- Methods
- Techniques
- Accuracy of instruments
- Interpretation of readings and measurements
- Solving problems

UNIT III - USE PROGRAMMABLE CONTROLLERS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Explain the context of use of programmable controllers

3.2 Use relevant OHS regulations codes of practice that govern the use of programmable controllers

3.3 Use codes of practice for programmable controllers

3.4 Explain the fundamental concepts and principle of programmable controllers

3.5 Identify the types of programmable controller programs

3.6 Select the appropriate timers used with programmable controller

3.7 Install programmable controllers

3.8 Programme timers

3.9 Use type of PC Programmes

3.10 Identify and minimize hazards

Content

To include but not limited to:

- Relevant regulations, codes of practice and Occupational Health and Safety requirements
- Foundational concepts and principles:
- Evolution of the programmable controller and applications
- Relay control, static logic control and programmable control
- Programmable controller
- Block diagram (inputs and outputs)
- Programmable controller advantages
- Programmable controller symbols
- Programmable controller functions
- Numbering systems start-up procedures
- Programming inputs and outputs
- Operation of programmable controller inputs
- PLC operation: scan cycle
- Basic programming
- Types of PC programs:
- Ladder diagrams
- Basic programming
- Program modification
- Ladder diagram development
- Connecting the programmable Controller
- Programming timers:
- Purpose of timers
- Timer instructions
- On-delay timer instruction
- Off-delay timer instruction
- Programming timers
- Retentive and non-retentive timers
- Cascading timers
- The self-resetting timer

- Monitoring timers
- Circuit conversion

• Hazards

- Tools and equipment:
- Types
- Functions
- Preparation
- Use
- Care and maintenance

• Methods and techniques used to develop, convert, enter and test control systems

- Anomalies:
- Types
- Causes
- Corrective measures

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Feedback will be in accordance with institutional policies

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role plays project and presentations.

RESOURCES

Lecturers, Tools and equipment, Measuring Instruments, Programmable Controllers, Materials

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	ESTIMATING AND COSTING WORK ACTIVITIES
COURSE CODE:	COSEEC2301
COURSE HOURS:	15 HOURS
CREDIT VALUE:	1
PREREQUISITES:	PERFORMING ENGINEERING MATHEMATICS CALCULATIONS -II
YEAR/SEM.:	YEAR 2, SEMESTER 4
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to prepare bills of estimates for material, labour, overheads, project auction (time) for the development of projects and work related activities. This course will look at developing project scope, project approval process and monitoring implantation.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students are competent when they are able to:

1. Determine project scope and specification
2. Interpret drawing or design specification
3. Extract bills of quantities
4. Source resource information or data
5. Use standards operating procedures to determine estimates.

6. Use relevant formulas to determine estimates
7. Obtain buy-in of management and staff
8. Source Costing/pricing information
9. Identify human resource requirement
10. Develop schedules, , Critical path analysis
11. Prepare estimates for project components
12. Set-up project monitory system
13. Produces appropriate documentation
14. Interpret and apply regulations and legislation

UNIT I: ESTIMATE MATERIAL REQUIREMENTS 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Explain the importance of preparing estimates of materials.
1.2 Provides information for planning and negotiation
1.3 Collect information regarding the project component
1.4 Develop performance objectives or requirements for project/work activities
1.5 Use accepted rule of thumb to make estimates
1.6 Identify types of materials required and their specification
1.7 Prepare list of materials required
1.8 Select and use tools for estimating materials
1.9 Develop Bills of Quantities
1.10 Estimate materials requirements with accuracy
1.11 Source prices from variety of suppliers
1.12 Compare prices and select the best prices for estimations
1.13 Estimates are detailed and accurate
1.14 Prepare documentations, reports and submit
1.15 Create preliminary material budget

Content

To include but not limited to:

- Tools for estimating:
- Paper worksheets
- Electronic Spreadsheets
- Set of guidelines (rules of thumb)
- Project scope
- Performance Objectives
- Sources of Prices
- Interpret:
- Drawing
- Specifications
- Instructions given
- Information Collected:
- Project Location
- Start-up date
- Owners
- Type of project (commercial, industrial, residential)
- Resource requirements

UNIT II – ESTIMATE CONSULTING TIME REQUIRED 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to

2.1 Explain the factors to be considered

2.2 Compare and contrast consulting time versus development time

2.3 Determine project scope from drawings, instructions, specifications given

2.4 Gather and analyze information

2.5 Analyze tasks requirements and complexity

2.6 Plan the projects and discuss with project team

2.7 Consult with team members and other professionals

2.8 Quality check plan before presentation to owners and suppliers.

2.9 Submit plan and obtain approval

2.10 Interact with production/work team on work

2.11 Develop project schedules

Content

To include but not limited to:

- Time:
- Consulting Time
- Development Time
- Task Activities
- Quality Checks
- Membership of Project Team
- Schedules
- Project Scope

UNIT III – ESTIMATE DEVELOPMENT TIME 2 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to

3.1 Determine factors to consider in estimation of development time.

3.2 Evaluate requirements of approved plan

3.3 Develop blue print and scope of activities

3.4 Develop prototype or samples as necessary

3.5 Requested evaluation of prototype by project team

3.6 Estimate development time using rule of thumb or guidelines

3.7 Use appropriate tools

3.8 Develop actual and precise work plans with milestones.

3.9 Determine administrative time

3.10 Determine labour time

3.11 Time number of days each activity will take

3.12 Develop Schedule Duration

Content

To include but not limited to:

Factors to be considered:

- Scope of activities/tasks for projects
- Guidelines/rule of thumb
- Prototypes
    - Tools for Estimating Time Required:
- Worksheet
- Electronic spreadsheets
- Rules of thumb or guidelines
    - Work Plans:
- Task activities specified
- Time activities
- Determine overlapping activities
- Determine critical path
- Outline resources requirement
- Time acquisition of resources
- Schedule Duration
- Identify task activity day
- Identify duration of each task
- Specify job activities/assignments

UNIT IV– ESTIMATE PROJECT COSTS 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Explain the importance of estimating labour costs

1.2 Determine factors to be considered when setting estimates for labour

1.3 Identify the prerequisites for making estimate of labour cost/project cost.

1.4 Identify the types of labour costs

1.5 Source prevailing rates for labour cost relevant to the type of project.

1.6 Analyze rates and select the most appropriate rate for costing labour.

1.7 Calculate direct labour costs with accuracy and according to rate schedule.

1.8 Calculate indirect labour cost.

1.9 Prepare fixed price contract with vendors and/or suppliers.

Content

To include but not limited to:

- Types of Labour Cost:
- Direct Cost
- Indirect Cost
- Labour Rates
- Methods of Calculation
- Fixed Price Contract
- Prerequisite for Labour Estimate
- Factors to considered

UNIT V – ESTIMATE OVERHEAD COSTS 2 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

5.1 Explain the importance of overheads

5.2 Identify types and sources of overheads

5.3 Implement ways to minimize overheads

5.4 Identify source of waste and reduce their impact

5.5 Estimate overhead for utility

5.6 Estimate overheads for transportation

5.7 Estimate overhead for inventory carrying costs

5.8 Estimate interest changes

5.9 Estimate costs for statutory deduction

5.10 Estimate for rentals of premises or property

5.11 Estimate rentals for equipment and large tools

5.12 Estimates are prepared according to organizational policies and regulations

5.13 Estimates are prepared with detail and accuracy

5.14 Insurance charges

Content

To include but not limited to:

- Types of overhead:
- Utilities:
- Water
- Light
- Telephone
- Internet
- Statutory Deductions:
- NHT
- NIS
- Education Tax
- PAYE
- Tax and investment and Interests
- Interest charges:
- Loans
- Ceases
- Mortgages
- Types of Insurance Charges
- Motor vehicles
- Property
- Equipment
- Utility

UNIT VI – PREPARE BUDGETS 2 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to

5.1 6.1 Follow organization's procedure for budget preparations

5.2 6.2 Differentiate the types of budgets and their uses

6.1 Use organization format for presentation of budgets

6.2 Prepare budget for materials

6.3 Prepare budget for time

6.4 Prepare budget for labour

6.5 Prepare budget for overhead

6.6 Prepare consolidated budgets

6.7 Prepare budget with details and accuracy

Content

To include but not limited to:

- Budget Format
- Type of Budget
- Consolidated Budget
- Follow regulatory requirements

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions and presentations.

CAPSTONE EXPERIENCE DESCRIPTION

Students will interpret given drawings, work instructions and other forms of specifications and prepare estimates for materials, labour and time for job completion. They will prepare budget for each element indicated and develop a consolidated budget. Project will be assessing according to rubrics given

RESOURCES

Required: Reading

1. COSTING 2nd Edition, T. Lucey, M.Soc.Sc., F.C.M.A., FCCA, J.Dip.M.A
2. Greer, M, Project Management: The Series. Performance and Instructions Journal

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	AUDITING OF RENEWABLE ENERGY SYSTEMS
COURSE CODE:	COSEENA2101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	RENEWABLE ENERGY SYSTEM 1
YEAR/SEM.:	YEAR 2, SEMESTER 4
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to conduct residential, commercial and industrial energy audits. They will be exposed to the audit process, audits plans/schedule, organization of resources for conduct of audits, audit traits, manage audit teams and audit process, preparation of audits reports and other related documentation, analyse audit finds, make recommendations and corrective action plans, presentation of reports to stakeholders and execute follow monitoring plan.

LEARNING OUTCOMES/INSTRUCTIONAL OBJECTIVES

Upon completion of this unit, students are competent when they are able to:

1. Explain the purpose on conducting energy audits
2. Explain the economic benefits of audits
3. Conduct audits, analyse documents findings, and present findings
4. Develop and implement audit plans
5. Use regulation and legislations in conducting audits

6. Develop corrective action Plans
7. Conduct follow-up monitoring to audits

UNIT I – LEGISLATURE BODIES ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Explain the functions of and need for energy management

1.2 Interpret energy management plans, legislations and regulations relevant to Residential, Commercial and Industrial facilities

1.3 Explain the purpose of Residential energy audit

1.4 Explain the purpose Commercial energy audits

1.5 Explain the purpose Industrial energy audits

1.6 Use legislations and regulations in conducting audits

1.7 Identify regulatory bodies responsible for implementation of legislations

Content

To include but not limited to:

- Energy Management Legislation and Regulation Regulatory Bodies
- National Building Code of Jamaica
- Jamaican Standards for Energy Auditing
- State based legislation for energy management in business
- NABERS Tenancy
- NABERS Office
- Building Energy Efficiency Certificates
- Renewable Energy Credits
- Small Technology Credits

UNIT II – CONDUCT RESIDENTIAL ENERGY AUDITS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1 Develop audit Plan and Scope

2.2 Prepare audit team

2.3 Identify the type of air conditioning technologies

2.4 Explain contributions of Solar PV and Solar Thermal Energy

2.5 Explain the impact of energy efficiency and energy consumption reduction

2.6 Apply energy auditing and practice for residential building

2.7 Apply Lighting Services Theory and efficient design

2.8 Water heating services and efficient design

Content

To include but not limited to:

- Residential energy audits
- Air conditioning technologies:
- High efficiency AC system types
- Heat load reduction
- Cold storage technologies
- Refrigerated type air conditioning
- inverter type air conditioning
- reverse cycle air conditioning
- evaporative air conditioners
- breeze power systems
- digital scroll compressors

- Contributions of solar PV and solar thermal energy to energy efficiency and/or energy consumption reduction

- Building construction technology encompassing:
- Masonry, poured concrete, wood and metal wall, foundation and roof structure construction techniques and resultant R values

- Air leakage sources and leak reduction techniques
- Window frame and glazing technologies, window films and resultant solar heat gain coefficient and R values
- Impact of building geometry and orientation on solar heat gain and wind heat loss/gain impacts
- Impact of exterior roof and wall colours on solar heat gain and night radiation losses
- Impact of thermal mass

• Energy auditing and practice encompassing:
- Scope of Jamaican Standards for energy auditing
- Energy audit process in relationship to data collection, analysis and the communication of results
- Accounts, bills and data, tariff structures
- Risks and hazards associated with conducting residential or small commercial/institutional energy audit
- Power rating of equipment and metering and measurement in residential or small commercial/institutional facilities energy audit
- Understand the implications of data recording intervals for monitoring equipment
- Options for improved lighting efficiency and operating cost reduction
- Illumination terms: lux and lumens
- Characteristics of light sources including efficacy, colour temperature and colour rendering index
- Ballast types, their efficiency and benefits
- Incandescent lamps, LED, induction lamps, halogen lighting, commercial fluorescent lighting, metal halide, mercury vapour
- Refrigerator and freezer star ratings

• Residential cooking appliance efficiencies and options for improved efficiency and cost savings
- Water reduction and water savings methodology

- Water auditing services theory:
- Water flow rate of taps, showers and irrigation, toilets, washing machines, dishwashers and filtration and top up water use for pool systems
- Trends of water use and charges
- Water efficiency labelling (WELS) scheme as it relates to water auditing
- Operation of a greywater system
- Factors that impact on garden water demand

- Water heating services and efficient design:
- Water heaters including electric and gas storage, gas instantaneous (continuous flow), electric heat pump and solar hot water heaters
- Solar water heater configurations and characteristics including passive (or thermo siphon) systems and active (or pumped) systems solar collector types, one shot booster
- Factors that influence water heater energy use including pipe work and fitting insulation, atmospheric conditions, water efficiency, temperature setting and maintenance & operation

- Lighting services theory and efficient design:
- Fundamental illumination design for domestic and small business
- Illumination in terms of light output, light level and brightness
- Determining target light levels for differing tasks
- Characteristics of light sources including efficacy, colour temperature and colour rendering index
- Ballast types, their efficiency and benefits
- Incandescent lamps, halogen lighting, domestic fluorescent lighting and comparisons between these and applications for the domestic and small business sector
- Application of lighting methodology for best practice energy efficiency design
- Energy saving lighting opportunities in the domestic and small business sector

UNIT III - CONDUCT COMMERCIAL ENERGY AUDITS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Develop audit plan and scope

3.2 Prepare audit Team

3.3 Explain energy auditing and practice for commercial building

3.4 Apply the Lighting Services Theory and efficient design

3.5 Identify factors that impact on refrigerator energy usage

3.6 Evaluate the food storage services and efficient design

3.7 Evaluate the water heating services and efficient design

Content

To include but not limited to:

- Commercial energy audits
- Water supply and use encompassing:
- Collecting and analysis of information for commercial facilities water use and methods to improve water efficiency in the home
- Ability to analyse the water consumption index for different commercial sectors
- Ability to analyse commercial facilities water use and ways to minimize the use of water
- Understanding on the methodology applied to water savings
- Calculating water star rating

- Energy auditing and practice encompassing:
- Scope of Jamaican Standards for energy auditing
- Energy audit process in relationship to data collection, analysis and the communication of results
- Accounts, bills and data, tariff structures and the identification of commercial tariff types
- Calculating energy and energy balance including power calculations, usage time calculations, power factor calculations and energy conversions from kwh to MJ
- Process involved in onsite assessment in a commercial facilities energy audit
- Gathering information on commercial facilities energy use and costs
- Risks and hazards associated in a commercial facilities energy audit
- Calculate energy and power

- Power rating of equipment and metering and measurement in a commercial facilities energy audit
- Calculating energy balance for commercial facilities
- Advice on ways to improve energy efficiency
- Calculating greenhouse emission, emissions factors, carbon intensity of electricity vs. natural gas and LPG and global warming potential and CO2 equivalents
- Financial analysis in terms of simple payback and simple payback period and return on investment or rate of return
- Reporting and communication of energy audit results
- Understanding and explaining the operation of the seven different power and energy monitoring equipment available
- Understanding the implications of data recording intervals for monitoring equipment
- Developing a power and energy monitoring strategy for a commercial facility
- Deploying commercial facility power and energy monitoring strategy
- Drawing conclusions and report on power and energy data collection in a commercial facility

- Lighting services and efficient design encompassing:
- Fundamental illumination design for commercial facilities
- Illumination terms: light output, light level and brightness
- Determining target light levels for differing tasks
- Characteristics of light sources including efficacy, colour temperature and colour rendering index
- Ballast types, their efficiency and benefits
- Incandescent lamps, LED, Induction Lamps, halogen lighting, commercial fluorescent lighting, metal halide, mercury vapour and comparisons between these and applications for the commercial facilities
- Application of lighting methodology for best practice energy efficiency design
- Energy saving lighting opportunities in the commercial facilities

- Food storage services and efficient design encompassing:
- Refrigeration system basics operation

- Different refrigeration models
- Refrigeration characteristics including operation, automatic defrost, cooling temperature control, ice maker, ice and water dispenser, door seals and hinges
- Factors that impact on refrigerator energy use including size, configuration temperature setting, clearance around cabinet and ambient conditions, making ice, ice and water and sweat heaters, seals, insulation, compressor efficiency and age
- Refrigerator and freezer star ratings
- Cold room and freezer room energy saving opportunities
- Food storage saving opportunities
- Food preparation services and efficient design encompassing:
- Different food preparation appliances
- Different operation of gas and electric hot plates and ovens and the advantages and disadvantages of each
- EMI food preparation methodology
- Food preparation saving opportunities
- Food preparation services and efficient design

• Water heating services and efficient design encompassing:

- Different water heaters including electric and gas storage, gas instantaneous (continuous flow), electric heat pump and solar hot water heaters
- Solar water heater configurations and characteristics including passive (or thermo siphon) systems and active (or pumped) systems solar collector types, one shot booster
- RECs and STCs and how these relate to solar water heater STCs
- Factors that influence water heater energy use including pipe work and fitting insulation, atmospheric conditions, water efficiency

• Temperature setting and maintenance & operation:

- Water heating / cooling calculations
- EMI water heating methodology
- Commercial water heating saving opportunities
- Types of entertainment and administration appliances found in commercial residences

UNIT IV – CONDUCT INDUSTRIAL ENERGY AUDITS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1 Develop audit plan and scope

4.2 Prepare audit Team

4.3 Identify energy management legislations and regulations

4.4 Explain Water supply and use for industrial properties and enterprises

4.5 Evaluate the food storage services and efficient design

4.6 Evaluate the water heating services and efficient design

4.7 Explain Smart Metering Solutions used in industrial properties and enterprises

4.8 Conduct Industrials Energy Audits

4.9 Analyse findings, determine correct actions, prepare and present reports

Content

To include but not limited to:

- Industrial energy audits

Energy Management Legislation and Regulation

- National Building Code
- Standards for Energy Auditing

- National based legislation for energy management in business
- Energy Efficiency Opportunities Act

- National energy reporting schemes
- Minimum Renewable Energy
- Renewable Energy Credits

- Small Technology Credits

- Water supply and use encompassing:

- Collecting and analysis of information for industrial facilities water use and methods to improve water efficiency in the industrial facilities
- Ability to analyse the water consumption index for different industrial sectors
- Ability to analyse industrial facilities water use and ways to minimize the use of water
- Understanding on the methodology applied to water savings
- Calculating of water star rating

• Energy management encompassing:
- Energy management strategies
- Practice based energy management
- Technology based energy management
- Interaction between human resources and practice based control
- Application of technology based energy management
- Identify potential energy savings from application of energy management

• Power and energy data recording encompassing:
- Identifying the structure and purpose of power and energy data recording for whole systems and equipment
- Reviewing or develop single line schematic of electrical system of an industrial facility
- Establishing the power and energy data gap from the energy audit to achieve standard compliant energy audits
- Identifying electrical loads that need to contribute more than 5% of energy use
- Understanding and explaining the operation of the seven different power and energy monitoring equipment available
- Understanding the implications of data recording intervals for monitoring equipment
- Developing a power and energy monitoring strategy for an industrial facility
- Deploying industrial facility power and energy monitoring strategy
- Drawing conclusions and report on power and energy data collection in an industrial facility

• Water auditing services and design encompassing:

- Water flow rates of taps, showers and irrigation, toilets, washing machines, dishwashers, filtration and top up water use for cooling towers and pool systems
- Industrial facility water meter reading
- Trends of water use and charges for industrial facilities
- Water Efficiency Labelling (WELS) Scheme relating to water auditing
- Identification of water efficiency
- Opportunities in industrial facility
- Assessments
- Operation of a rain water and grey water systems
- Factors that impact on landscape water demand
- Thermal performance and climate control encompassing:

• Thermal performance of a building impacts on heating, ventilation and air conditioning energy use including:

• Orientation, thermal mass, insulation, glazing, shading and ventilation
- Air conditioning designs including central, ducted systems, split-system air conditioners, multi-headed split systems, individual room air conditioners (rac), through wall / window and portable units
- Improvement to air movement systems in industrial facilities including diffusers
- Improvement to ventilation systems in industrial facilities
- Improvement of thermal performance of an industrial building envelop elements
- Application of climate zones
- Air conditioning technologies including refrigerated type air conditioning, inverter type air conditioning, reverse cycle air conditioning, evaporative air conditioners, breeze
- power systems and digital scroll compressors
- Application of Energy Efficiency Ratio (EER) and Coefficient of Performance (COP) and show proficiency in EER and COP calculations
- Application of the Air Conditioning Star Ratings to Industrial facilities
- Gas and electric heating options and air (ducted) heating

- Operation of an air conditioning system and describe each component including the compressor, evaporator, condenser, expansion valve and fan coil
- Ceiling and pedestal fans and ventilation climate control
- Factors that impact on climate control energy consumption
- Best practice climate control methodology as applied to the Industrial facilities
- Industrial facilities climate control saving opportunities
- Conducting thermal performance assessment of Industrial facilities
- Entertainment and administration services and efficient design encompassing:
- Appliance standby power including the different mode, passive and active standby
- Appliance energy star ratings
- MEPS and labelling requirements for televisions
- Network standby management strategies
- Computer energy consumption including computer power management, entertainment and administration saving opportunities
- Industrial services and efficient design encompassing:
- Compressed air, hydraulic and steam systems
- Overview of industrial services in relation to industrial sector
- Compressed air, hydraulic and steam system selection and design
- Compressed air, hydraulic and steam system theory, energy balance for a typical systems in industrial processes
- Energy efficiency pumping compressed air, hydraulic and steam systems design methodology
- Energy efficiency compressed air, hydraulic and steam systems
- Industrial pumping compressed air, hydraulic and steam systems saving opportunities
- Smart metering solutions encompassing:
- Benefits of the different metering available to the industrial sector
- Metering opportunities relation to industrial sector
- Renewable energy (solar PV) encompassing:
- Design of solar PV systems and different panel types including mono-crystalline, poly-crystalline and amorphous
- Solar panel characteristics and choice of selection

- Solar power system utility approval process
- Balance of systems, rules of thumb, shading, orientation and shading of strings in an on grid solar power system:
- Solar PV energy calculations and calculate rec entitlement for a small solar PV system
- Different feed-in tariff schemes and how they apply to solar PV

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

Field visits to sites, formal lectures, online activities, Resource Persons, researches and group presentation

CAPSTONE EXPERIENCE DESCRIPTION

Students will be given assignment to plan and conduct Audits for Residential Energy System and Commercial Energy System. Analyse findings, prepare and present report.

RESOURCES

Lecturers, Resource Persons

On site – Visits, Audit specifications, samples of audit reports, reading materials

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	APPLYING LEGAL AND REGULATORY REQUIREMENTS
COURSE CODE:	COSEAPL2301
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 2, SEMESTER 4
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to apply laws and regulations relevant to the renewable energy sector in performing work in the sector. Application of these laws and regulations is critical to ensure that businesses are operating within the parameters of the various laws regulations

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students are competent when they are able to:

1. Understand the legal environment, its principles and procedures
2. Examine how these principles impact the Renewable Energy Sector.
3. Evaluate the legal relationship between the various stakeholders in the industry
4. Use legal principles to guide business decision making
5. Analyze organizational structure and business processes

UNIT I – ANALYZE ORGANIZATIONAL STRUCTURE 9 HOURS

Specific Objectives

Upon completion of this course, students are competent when they are able to:

1.1 Explain Sole Proprietorships

1.2 Explain the importance of Sole Proprietorship

1.3 Explain Partnership

1.4 Identify the benefit of Partnership

1.5 Identify the types of Partnerships

1.6 Explain Corporation/Company

1.7 Identify the benefits of Corporation

1.8 Identify the types of Corporations/Companies

1.9 Interpret relevant legislations

Contents

To include but not limited to:

- Sole Proprietorship
- Partnership
- Corporation
- Types of Partnerships
- Types of Capital Structure/Funding

UNIT II – ADHERE TO LAWS AND REGULATION 12 HOURS

Specific Objectives

Upon completion of this course, students are competent when they are able to:

2.1 Identify the law related to renewable energy sector operation.

2.2 Identify the duty of care which operators should demonstrate to stakeholders.

2.3 Identify the laws that are related to employees

2.4 Define workplace discrimination and sexual harassment

2.5 Examine the disabilities act

2.6 Examine the types of discrimination in employment act

2.7 Examine and apply the requirements of the Labour Laws

Contents

To include but not limited to:

- Business /Trade Licenses
- Professional Licenses
- Permits
- Employment related issues:
- Recruitment:
- Selection and Hiring
- Unions
- Payroll Taxes
- Wage Payments/ Overtime
- Statutory Deductions and Contributions
- Harassment Prevention
- Worker evaluation and Performance Management
- Workplace discrimination
- Restaurant Operations related issues:
- OSHA
- Fairness Fair Trading Act
- Food Safety
- Insurance requirements, including:
- Workers' Compensation Benefits
- Company Liability
- Personal Liability
- Stakeholders:
- Customers
- Suppliers
- Shareholders
- Regulatory bodies

UNIT III – INTERPRET CONTRACTS 8 HOURS

Specific Objectives

Upon completion of this course, students are competent when they are able to:

3.1 Explain the nature of contracts

3.2 Analyze and interpret the terms and conditions of contracts

3.3 Adhere to terms in a contract

3.4 Identify breaches and remedies of contract

3.5 Apply methods of terminating a contract

3.6 Adhere to the major tenets of Contract Law

3.7 Explain the term quantum meruit

Content

To include but not limited to:

- Definition of a Contract
- Essentials of a valid Contract (offer, acceptance, consideration, capacity, legality, etc.)
- Types of Contracts (Specialty/Simple)
- Classification of Contracts (Express, Implied, Bilateral, Unilateral, Void, Voidable, Unenforceable)
- Terms in a Contract (Exemption, Clauses, Mistakes, Misrepresentation)
- Breach of Contract
- Termination of a Contract – Frustration, Agreement, Performance
- Quantum meruit

UNIT IV – ADHERE TO LAWS RELATED TO CUSTOMERS 6 HOURS

Specific Objectives

Upon completion of this course, students are competent when they are able to:

4.1 Interpret and apply the laws related to Customers

4.2 Execute the responsibilities to all Customers

4.3 Carry out responsibilities related to provision of services

4.4 Determine liability responsibilities to Customers

4.5 Adhere to quality and customer service policies

Contents

To include but not limited to:

- Duty of care, reasonable care
- Responsibilities to all customers
- Responsibilities related to serving food
- Responsibilities related to serving alcoholic beverages
- Liability
- Quality and Customer Service Policies

UNIT V – ADHERE TO CONSUMER PROTECTION ACTS **6 HOURS**

Specific Objectives

Upon completion of this course, students are competent when they are able to:

Define "consumer" and "consumer protection"

Explain why consumers need protection

Identify and explain the roles of a variety of consumer protection agencies

Adhere to legislations and regulations

Content

To include but not limited to:

- Criminal implications of the law.
- Defective goods and services
- Prevention and Criminal sanctions
- Enforcement
- Legislations and Regulations

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, practical demonstration, case studies and presentations.

RESOURCES

Required:

1. Hayes, D., K., Miller, A., A &Ninemeier, J., D. (2014). The Professional Restaurant Manager". Prentice Hall:Pearson Education.
2. ISBN-13: 978-0-13-274008-1/ISBN-10: 0-13-274008-7-2

Suggested Reading:

1. Morris, K., Cournovyer, N., & Marshall, A. (2007). Hotel, Restaurant and Travel Law. 7thCengage Learning Publishing

COURSE OUTLINES

YEAR 2

SEMESTER 4

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	USING ELECTRICAL POWER DISTRIBUTION SYSTEMS
COURSE CODE:	COSEEPD2101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 2, SEMESTER 4
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to design, install and maintain A.C. circuits, measure electrical quantities, and select and purchase electrical materials and components according to electrical power specification.

LEARNING OUTCOMES/INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students are competent when they are able:

1. Explain system for generation and distribution of A.C. power
2. Interpret regulations OHS and codes of practices
3. Design and install electrical circuits
4. Measure electrical quantities detect and correct faults
5. Detect and correct faults
6. Use formulae to calculate electrical quantities

UNIT I: WORK PERFORM ON MULTIPLE PATH CIRCUITS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Explain the functions of multiple path circuits

1.2 Identify characteristics of multiple path circuits

1.3 Apply the relevant regulations, codes of practice and Occupational Health and Safety in working on complex multiple path circuits

1.4 Select and use tools, equipment and testing devices to work on complex multiple path circuits

1.5 Identify types of hazards and mitigate risks

1.6 Identify faults and implement corrective actions

1.7 Test and record findings on circuits

1.8 Work on complex circuits following procedures

Content

To include but not limited to:

- Hazards associated with working in complex multiple path circuits
- Tools, equipment and testing devices:
- Functions
- Preparation
- Use
- Care and maintenance
- Testing and fault finding in complex multiple path circuits

UNIT II: ELECTRICAL POWER GENERATION AND DISTRIBUTION 4 HOURS

Specific Objectives

Upon completion of this unit students are competent when they are able to:

2.1 Explain the system of power generation and distribution.

2.2 Explain Laws and regulations

2.3 Identify the electrical phases for distribution of electricity

2.4 Identify the type of power distribution for different facilities

Content

To include but not limited to:

- Jamaican System of Power Generation
- Distribution Phases: Single, Two, and Three
- Electrical Laws
- Different Facilities: Residential, Industrial, Commercial

UNIT III – ANALYSE A.C. CIRCUITS 6 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Explain the function of A.C. circuits

3.2 Differentiate between A.C. circuits and D.C. circuits

3.3 Explain the characteristics of A.C. circuits

3.4 Solve electrical problems using the properties of A.C circuits

3.5 Use terms connected with A.C circuits

3.6 Analyse structure of A.C. circuits

3.7 Calculate electrical quantities of A.C. circuits

3.8 Measure quantities in A.C. circuits

3.9 Connect series circuits, parallel circuits and series-parallel

3.10 Interpret OHS and other regulations

Content

To include but not limited to:

- Function and operation of an electronics circuit simulation program
- Networks containing up to three nodes
- Using mesh analysis to find currents in A.C. Networks of up to two loops
- Time domain and frequency domain
- Frequency, angular frequency and units of measurement
- Defining RMS and convert between time domain and RMS phasor values for a sine wave
- Representing A.C. Voltages on a phasor diagram
- Defining impedance, resistance and reactance

- Defining admittance, conductance and susceptance
- Series equivalent impedance
- Parallel equivalent impedance

UNIT IV - APPLY A.C. CIRCUITRY CONSTRUCT AND LAWS 4 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1 Explain the functions of A.C. circuit thrones concepts

4.2 Explain the use of electrical current laws

4.3 Solve problems using, Kirchhoff's laws, Voltage divider and current divider rules

4.4 Explain the Mesh, Node and Nodal analysis of circuitry

4.5 Calculate power values of A.C. circuits

4.6 Measure power in A.C. circuits

4.7 Use mesh and nodal equations for A.C. Network containing up to three loops.

4.8 Explain functions and operations electronic circuit simulation programme

4.9 Solve problems using the Star-delta transformation formula equations

4.10 Explain difference between true power, reactive power and apparent power in A.C. circuitry.

Content

To include but not limited to:

- Kirchhoff's laws
- Voltage divider and current divider rules
- Function and operation of an electronics circuit simulation program
- Mesh analysis
- Node voltages and nodal analysis
- Matrix representation
- Method of determinants
- Writing mesh equations for A.C. Networks containing up to three loops.
- Writing nodal equations for A.C. Networks containing up to three nodes.
- Star-delta transformation formula equations

- Selection of appropriate conversion
- True power, reactive power and apparent power
- Maximum power transfer
- Transients in R-C and R-L circuits' growth and decay 2.

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Feedback will be in accordance with institutional policies

INSTRUCTIONAL METHODS

Video, Handout and practical demonstration, think pair share

CAPSTONE EXPERIENCE DESCRIPTION

Students will conduct experiments on types of A.C. circuits' measure and record quantities use electrical formulae to determine electrical quantities prepare reports using Standard English on findings and recommendations.

RESOURCES

Required Texts:

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	DEVELOPING ENTREPRENEURSHIP STRATEGIES
COURSE CODE:	COSEDED 2401
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 2, SEMESTER 4
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to pursue self-employment opportunities through crafting of entrepreneurial strategies.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students will be introduced to entrepreneurial strategies in the operation of small businesses. The essentials of starting a small business from the generation of an idea through the actual operations will be examined.

Upon successful completion of this course, students competent when they are able to:

1. Employ entrepreneurial strategies to create business ventures
2. Apply the concepts and practices of business planning.
3. Develop a financial plan for a small business.
4. Interpret financial statements of a small business.
5. Conduct market research/feasibility study.

6. Prepare a business Plan for a new venture.
7. Distinguish between Sole Trader and Partnership

UNIT I: USE PARAMETERS AND CONCEPTS OF BUSINESS VENTURES 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Explain the differences between sole proprietorship and partnership

1.2 Source Venture Capital

Content

To include but not limited to:

- Sole Proprietorship
- Partnership
- Venture Capital

UNIT II – CONDUCT FEASIBILITY STUDIES 6 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1 Identify the components of a needs analysis

2.2 Discuss general market characteristics

2.3 Identify the components of a site evaluation

2.4 Explain the concept of supply and demand

2.5 Discuss characteristics of capital investment

2.6 Identify various financing methods

Content

To include but not limited to:

- Needs analysis
- General market characteristics
- Site evaluation

- Supply and demand analysis
- Capital investment
- Financing methods

UNIT III – PREPARE BUDGETS 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Explain the budget cycle

3.2 Identify the long vs. short term budget

3.3 Explain an operating budget

3.4 Explain a fixed budget

Content

To include but not limited to:

- Cycle
- Long term/short term
- Operating budget
- Fixed budget

UNIT IV– FINANCIAL STATEMENTS 10 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1 Identify and prepare in detail:

4.2 The income statement

4.3 The balance sheet

4.4 The statement of changes in financial position

4.5 Differentiate between organizational costs and organizational expenses

4.6 Interpret financial statements through the process of ratio analysis

4.7 Illustrate and translate break-even analysis given specified criteria

4.8 Conclude the business decision-making process given specified criteria from various financial statements

4.9 Grants

4.10 Fiscal Incentives

Content

To include but not limited to:

- Financial statements

UNIT V– DEVELOP BUSINESS PLAN **20 HOURS**

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

5.1 Discuss and identify components of a business plan

5.2 Explain the goals and objectives of a business plan

5.3 Explain the term "market analysis"

5.4 Determine product costing and pricing

5.5 Explain the legal requirements when making a business plan

5.6 Develop Business Plan

Content

To include but not limited to:

- Components of a business plan
- Goals and Objectives
- Market analysis
- Product costing/pricing
- Legal requirements

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending class, completing assigned work, and complying with existing copyright legislations.

To successfully complete this courses, students must pass ALL of the different components of course assessments (test, case studies, projects, capstone assignments, projects, presentations) meeting the minimum pass mark requirements.

ASSESSMENT

The assessment for this course takes the form of:

A minimum of Four (4) assignments 60%

A project in which students are required to prepare an extensive business plan for the setting up of an enterprise 40%

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role playsproject and presentations.

RESOURCES

Required:

Small Business Management, 3rd Edition, D Stokes; published by Letts Educational Essentials of Entrepreneurship

ENTREPRENEURSHIP PROJECT

Objectives

1. The project is designed to assist students in developing an appreciation of specified criteria in the business world.
2. To familiarize students with various aspects of record keeping and vital pre-requisites in the development and operation of small business

3. To provide students with the foundation necessary and to create an environment whereby the entrepreneurial skills of the student may be stimulated and brought to the fore.

PROJECT

You are required to select a service-oriented business; e.g., a nursery school, a food service outlet, a mini-mart, tourism ancillary service, etc and establish in a location of your choice. The area will be suitable for the operation you have selected as will be indicated by your feasibility study.

You have a personal savings account of $---------- with which you desire to start operation and need a further amount, which must not exceed $---------- (an amount which you will obtain from your banker or some other financial institution), to form your initial capital base. This loan is optional and should be used only if desired. This business may be set up either as a sole business or as a partnership. Five (5) students may join together to prepare a project.

OUTLINE

The business should be looked at from the following perspectives:

2. Nature and background
3. The feasibility study
4. Organization and control
5. Other factors

NATURE and BACKGROUND

1.1 Give a detailed description of the type of business, which you are proposing.

1.2 Give the name of the business and the reason for the name you have chosen.

1.3 Give the exact location of your proposed business and your proposal for the acquisition of such business, e.g., by rental, purchase, leasing, mortgage, etc.

1.4 State the philosophy of the business, its mission and ethics.

1.5 State the factors, which will contribute to your business being more successful than similar businesses.

THE FEASIBILITY STUDY

A feasibility study is essentially an analysis of the market information, the operational concepts and the financial considerations that you will gather for your proposal in order to determine whether or not your venture will be a viable one.

The components of the feasibility study should be along the following lines:

A. The market survey

B. The site evaluation

C. The financial aspects

D. The Market Survey

- Potential customers
- Their location, number, income levels, ages and sex
- Occupational patterns (if applicable)

Surrounding Areas

- Attractions
- Types of industries
- Type of businesses

Competition

- Number and type of service facilities
- The quality of the existing facilities
- Their market share
- Your sales volume potential
- Your turnover rates (if applicable)

Sale Generators

The factors, which will generate business towards your facility (this will depend on the type of facility that your propose).

- Examples would be as follows: conventions, office buildings, factory workers, residential developments, shopping areas, school population, baby boom, etc.

A. Site Evaluation

Physical Characteristics

- Site and shops: a detailed floor plan drawn to scale should be provided (consideration should be given to parking areas, entrances and other exterior areas requires).
- Availability of utilities
- Positional characteristics: relationship to shopping centres, commercial areas, recreational areas, etc.
- Relationship to transportation facilities: easy access to/from site.
- Service facilities - Is the area adequately serviced? e.g., garbage and trash pickup.

B. Financial Aspects

Capital Projections

- Land and construction costs (if applicable). Compile schedule to indicate.
- Furnishing and equipment costs. Include interior decorating, e.g., floor coverings, wall coverings, (if applicable), and exterior decorating, e.g., displays and electric signs (if applicable). Compile schedule to indicate.
- Operating equipment. For hotels, this would include chinaware, glassware, silverware and linen. Compile schedule to indicate.

Revenue Projections

- Operational Capital. A cash flow statement projecting cash considerations for at least the first two years of operation.
- Projected Income. A projected income statement indicting revenues and expenditures for the first two years of operation.

ORGANIZATION AND CONTROL

3.1 Records management

3.2 State proposal for establishing and maintaining one or more cash accounts within the banking system.

3.3 Indicate types of accounts, location of bank, account numbers.

3.4 State the accounting system to be pursued: the sales policy; cash or credit.

3.5 Indicate proposals for cash disbursements and cheques, filing of purchase and sales invoices, etc.

OTHER FACTORS

4.1 Fiscal year

- End of business
- Best suited for type of business

4.2 Staff

- Number of employees
- Remuneration
- Incentive plan

4.3 Advertising

- Type of advertising
- Kind of media
- Estimated costs
- Objectives
- Markets
- Age groups, etc.

4.4 Further considerations

- Outside services
- financial
- legal, etc.
- Policies of the business
- Competitive pricing and service
- Any other consideration important to your particular enterprise.

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ASSESSMENT PROCEDURES

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On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**

1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, practical demonstration, case studies and presentations.

RESOURCES

Required:

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	DESIGNING AND INSTALLING RENEWABLE ENERGY SYSTEMS II
COURSE CODE:	COSERES2401
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	DESIGNING AND INSTALLING RENEWABLE ENERGY SYSTEMS I
YEAR/SEM.:	YEAR 2, SEMESTER 4
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to design and install thermal heating systems, Solar System and Wind Systems.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students are competent when they are able to:

1. Install Thermal Heating System
2. Install Wind System
3. Solar Syste

UNIT I: INSTALL THERMAL HEATING SYSTEM 6 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Explain relevant OHS regulations and codes of practice that govern the installation thermal heating systems

1.2 Install different type of renewable thermal heating systems

1.3 Design and sizing of renewable thermal heating systems

Content

To include but not limited to:

- Relevant regulations, codes of practice and Occupational Health and Safety requirements
- Types of renewable thermal heating systems:

- Commercial solar hot water heaters
- Domestic solar water heaters
- Pool solar hot water heaters

- Design and sizing of renewable thermal heating systems
  - Relevant science, technology, engineering and mathematical principles:

- Heat transfer (modes, conduction, convection, radiation, combined conduction and convection, types of heat exchanges)
- Combustion (the combustion process, fuels, air/fuel ration, emissions and pollutants, combustion equations, combustion products)
- Steam (importance, steam/water properties, temperature, generation, safety devices and controls, steam plant, heat transfer rates, steam throttling and flash steam)
- Daily irradiation
- Heat system technologies (types, application, operating parameters, component parameters and configuration, system performance requirements)
- Use refrigeration/heat pump (vapour compression cycle, types of refrigerants, ideal and actual vapour compression cycles, energy balance and heat transfer, Carnot Principle)
- Providing energy balance (heat transfer mechanisms, reducing heat losses from collector, providing energy balance)

- Solar collector use and performance (factors that affect selection of materials, features of collectors, tests for collector construction, tests for thermal performance)
- Hydraulic circuits (function and components, types and size components, safety requirements, requirements to balance flow, water and energy conservation, types and level of insulation)
- Considerations
- Design alteration

• Development and preparation of project for installation and commissioning:
- Tasks and activities involved in installation and commissioning of system
- Work breakdown planning
- Considerations
- Responding to unplanned events
• Installation and commissioning of renewable thermal heating system:

- Methods
- Techniques
- Tests
- Conducting customer walk-through

• Servicing and maintenance of renewable thermal heating systems:
- Job safety analysis and implementation
- Scheduled and unscheduled servicing and maintenance
- Solving mechanical and electrical problems

UNIT II: INSTALL SOLAR SYSTEM 10 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

a. Explain relevant OHS regulations and codes of practice that govern the installation solar systems

b. Install different type of solar systems

c. Design and sizing of solar systems

Content

To include but not limited to

- Designs
- Methods
- Legal requirements
- Costs

UNIT: III INSTALL WIND SYSTEM 10 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Explain relevant OHS regulations and codes of practice that govern the installation solar systems

3.2 Install different type of solar systems

3.3 Design and sizing of solar systems

Content

To include but not limited to:

- Designs
- Methods
- Legal requirements
- Costs

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ASSESSMENT PROCEDURES

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On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be documented on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role plays project and presentations.

RESOURCES

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FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	MANAGING RENEWABLE ENERGY PROJECTS
COURSE CODE:	COSEPMG2101
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	USING COMPUTER APPLICATIONS
YEAR/SEM.:	YEAR 2, SEMESTER 4
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to manage projects and to work in an environment where the successful management of projects is critical to the meeting of timeline to avoid cost overruns, and to maximize the use of resources and to meet customer satisfaction. Students will be exposed to project management software, project management tools, such as GANTT charts, critical path. Analysis, management of project teams, management of multi-projects, and to manage the projects life cycle.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students are competent when they are able to:

1. Develop and scope project activities
2. Schedule and timeline project activities
3. Implement and monitor projects
4. Manage multi-projects

5. Use project management software and tools
6. Do critical path analysis
7. Use resources efficiently
8. Avoid cost overruns
9. Manage project teams
10. Prepare and implement contingency plan
11. Follow project procedures
12. Motivate project team
13. Interface successfully with stakeholders of projects
14. Manage risk associated with projects implemented

UNIT I: PREPARE PRE-PROJECT SETUP/INITIATION 9 HOURS

Specific Objectives

Upon completion of this course, students are competent when they are able to:

1.1 Define project management
1.2 Identify the characteristics of a project
1.3 Interpret the requirements to complete a pre-project setup/initiation
1.4 Apply the steps in validating a project
1.5 Explain the contents of a project charter
1.6 Summarize the project life cycle
1.7 Conduct feasibility arrays
1.8 Align project to strategic plan
1.9 Develop a project charter

Content

To include but not limited to:

- Definition of Project Management
  - The planning, organizing, and managing of tasks and resources to accomplish a defined objective, usually with constraints on time and cost.
- The Definition and Characteristics of a Project:

- Temporary endeavour

- Delivers a unique product or service
- Bound by time
- Resources and quality

- Completing a Pre-Project Setup/Initiation:
  - Identify the project
  - Validate the project
  - Prepare a project charter
  - Obtain approval for a project charter
- Validating a Project:
  - Validate business case: Feasibility analysis, Justification for project, Alignment to strategic plan
  - Identify and analyse stakeholders
- Project Charter
  - Key project deliverables
  - High level milestones
  - High level cost estimates
  - Identify stakeholders
  - General project approach
  - Problem statement
  - High level assumptions
  - High level constraints
  - High level risks
  - Project objectives
- Project Life Cycle
  - Initiating/Pre-project setup
  - Planning
  - Executing
  - Monitoring/controlling

- Closing project

UNIT II: PLANS PROJECT PLANNING 25 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

a. Prepare a project scope document based on an approved project charter
b. Use a Work Breakdown Structure (WBS) and WBS dictionary to organize project planning
c. Outline a process for managing changes to the project
d. Develop a project schedule based on WBS, project scope and resource requirements
e. Create a project schedule using Project Management Software
f. Evaluate a desired deliverable, apply the appropriate tool and/or method to produce the appropriate outcome
g. Interpret the results of using project management tools and/or methods in a given scenario
h. Identify components of an internal/external communication plan
i. Outline the components of a risk management plan
j. Identify roles and resource requirements based on WBS and resource availability
k. Identify components of a quality management plan
l. Identify components of a cost management plan
m. Follow the procurement process for a project implantation
n. Explain the purpose and common components of a transition plan

Content

To include but not limited to:

- Project Scope Document
  - Key Performance Indicators (KPIs)
  - Scope boundaries
  - Constraints
  - Assumptions

- Detailed objectives
- Final project acceptance criteria
- Validate scope statement with stakeholders

- Work Breakdown Structure and Work Breakdown Structure Dictionary
  - Explain the benefits of WBS
  - Explain the levels of a WBS
  - Explain the purpose of a WBS
  - Identify the planning processes which utilize the WBS as an input
  - Critique a given WBS
  - Explain the purpose of a WBS dictionary
- Project Update Management
  - Approvals required
  - Forms needed
  - Turnaround times
  - Document routing
  - Communication flow
- Project Scheduling
  - Listing and sequencing project tasks according to job requirements
  - Estimation of task duration
  - Schedule to milestones
  - Analyze Gantt chart
  - Identify dependency types
  - Determine the critical path of a project schedule
  - Establish schedule baselines
- Tool Selection for Appropriate Deliverable Handling
  - Tools: - PERT, Gantt
  - Methods, CPM
  - Result Interpretation
  - Tools: GERT
  - Methods - Network diagram (ADM, PDM, CDM, CCM)
- Project Management Software (Lab component)

- Inserting new and recurring tasks
- Deleting, moving tasks
- Sub-tasks (Indent and Outdent)
- Viewing the Gantt chart & PERT chart (identifying the critical path, milestones)
- Reports – task usage, costs, over allocated staff, completed tasks
- Resource levelling
- Updating tasks
- Change non-working time (e.g. public holidays)

• Internal / External Communication
- Frequency
- Format (formal, informal, written and verbal)
- Method of distribution
- Distribution list

• Risk Management Plan
- Initial risk assessment
- Risk matrix
- Risk register
- Risk response strategies
- Stakeholder risk tolerance

• Roles and Resource Requirements
- Identify existing resource availability
- Identify training needs / outsourcing requirements
- Assign resources to scheduled tasks

• Quality Management Plan
- Quality metrics, control limits, and frequency of measurement
- Quality assurance processes
- Quality control processes

- Quality baseline

- Cost Management Plan
  - Control limits
  - Assign costs
  - Chart of accounts
  - Project budget
  - Cost estimates (bottom up, top down, parametric, expert judgment, analogous)
  - Cost baseline
- Procurement Process
  - Project needs assessment / gap analysis
  - Make or buy decision
  - RFI, RFQ, RFP (Request for: Information, Quote, Proposal)
  - Request seller response
  - Evaluate seller response
  - Vendor selection
  - Contract development
- Transition plan
  - Ownership
  - Transition dates
  - Training
  - Extended support
  - Warranties

UNIT III - LEAD PROJECT MANAGEMENT TEAM 9 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1. 3.1. Evaluate different leadership styles
2. 3.2. Evaluate the impact of the different leadership styles

3. 3.3. Demonstrate the characteristics of effective project leader

3.4. Differentiate between leadership and motivation

3.5. Select the most appropriate leadership style given particular scenario

3.6. Select the most appropriate method to motivate the project team given a particular scenario

3.7. Coordinate human resources to maximize project performance

3.8. Explain the importance of a project kick-off meeting

3.9. Conduct the project kick-off meeting

3.10. Explain the purpose and influence of organizational governance on a project's execution

3.11. Select components of a project plan affected by governance and determine actions to be taken

3.12. Explain the different types of project organizational structures

3.13. Select the most appropriate way to manage a project given an organizational structure

Content

To include but not limited to:

- Leadership and Motivation
- Definition of leadership
- Leadership styles: Task oriented, Participative, Autocratic, Reward based, Laissez faire, Situational
- Definition of motivation
- Motivation Theories: Maslow's hierarchy, David C McClelland's motivational needs theory, Frederick Herzberg's Motivation – Hygiene (Two Factor) Theories
- Coordinating Human Resources
- Assemble and develop project team, build team cohesiveness, perform individual performance appraisals
- Identify common causes of conflict: Competing resource demands, Expert judgment, Varying work styles
- Detect conflict and apply conflict resolution techniques: Smoothing, Forcing, Compromise, Confronting, Avoiding, Negotiating

- Project Kick-off Meeting:
- Communicates stakeholder expectations, high level timeline, project goals and objectives, roles and responsibilities to the project team

- Organizational Governance:
- Standards compliance: Local, state, federal, ISO
- Internal process compliance: Audit trails, retention, version control
- Decision oversight: Change Control Board, committee consulting
- Phase gate approval: Tollgate approval, project phase transition

- Components of Project Plan Affected and Actions:
- Actions: Schedule meetings, Manage scope, Follow communications plan, Manage project quality, Manage risks, Issue management, Prepare performance
- reports, Receive work performance information, Manage costs within budget, Implement approved changes
- Components: Risk register, Communications plan, Issues log, Change management form, Quality management metrics, Project schedule, WBS, Budget, Resource requirements, Scope statement

- Types of Organizational Structures
- Functional
- Weak matrix
- Matrix
- Strong matrix
- Project Based

UNIT IV: MANAGE PROJECTS **9 HOURS**

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1 Explain project management procedures

4.2 Follow project management procedures in execution of projects

4.3 Manage projects according to project plan, scope and time lines

4.4 Implement change management procedures given a scenario

4.5 Evaluate the impact of potential changes to triple constraint

4.6 Use risk management plan to determine appropriate response to potential risks or opportunity events

4.7 Execute appropriate resource levelling techniques

4.8 Apply the appropriate steps to ensure quality of project deliverables

4.9 Identify tools to use when a project deliverable is out of specifications

4.10 Calculate and interpret the results of Earned Value Measurements (EVM).

4.11 Manage and implement information distribution based on communication plans

4.12 Address the special communication needs internal and/or external project team members.

Content

To include but not limited to:

- Project Management Procedures
  - Identify change
  - Document using the appropriate change control forms
  - Perform impact analysis
  - Coordinate with the appropriate stakeholders to select the course of action
  - Update the appropriate project plan components based on the approved change request

- Triple Constraint
  - Time / Schedule
  - Cost / resources
  - Quality
  - Scope
- Risk Management Plan

- Perform qualitative and quantitative risk analysis
- Opportunities: Sharing, Exploiting, Enhancing
- Threats: Avoidance, Acceptance, Mitigation
- Update risk register with appropriate changes

• Resource Levelling Techniques

- Fast tracking
- Crashing
- Delaying
- Optimizing: Use of tools as necessary

• Ensuring Quality of Project Deliverables

- Monitor work performance
- Analyze performance information
- Identify variances
- Generate change requests
- Implement change requests

• Tools to use when a project deliverable is out of specification

- Pareto charts
- Histograms
- Run charts
- Ishikawa diagram

• Earned Value Measurement (EVM)

- EV
- PV
- CPI
- SPI
- EAC
- ETC
- VAC
- BAC

• Information Distribution based on Communications plan

- Manage stakeholders' expectations

- Schedule effective project meetings
- Periodic stakeholders updates
• Special Communication Needs
- Time zones
- Language barriers
- Technology barriers
- Cultural differences
- Communication preferences
- Functional or hierarchical barrier

UNIT V: CLOSE OUT PROJECT 5 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

5.1 Differentiate the types of closure of Projects

5.2 Explain the importance of and benefits of formal project closure

5.3 Determine circumstances in which project closure may occur

5.4 Implement the various closing tasks

5.5 Identify the components and purpose of closing documentation

5.6 Prepare closing documents

5.7 Close out projects following approved procedures

Content

To include but not limited to:

• Types of closure
- Definition of closure/termination
- Termination by extinction
- Termination by addition
- Termination by integration
- Termination by starvation
• Formal Project Closure
- Importance and benefits

- Phase Closure:
- Phase closure
- Project completion
- Stage completion
- Component completion
- Project cancellation – change in environment, lack of funds, better alternatives
- Closing Tasks:
- Ensure that tasks have been completed
- Confirm and document objectives that were completed/not completed
- Meet with stakeholders to get their final approval
- Finalize contractual commitments - to vendors, suppliers etc.
- Transfer responsibilities (e.g. maintenance tasks)
- Reassign people
- Conduct performance appraisals
- Release and reassign resources
- Ascertain any product support requirements
- Complete final accounting
- Provide historical information for future use
- Standards compliance: Document retention compliance
- Document the results
- Have a formal meeting to acknowledge completion.
- Review the results – what went right/wrong
- -
- Closing Documentations
- Lessons learned: Strengths / weaknesses
- Close report: Historical data, Summary of costs
- Post mortem analysis: Documents reasons for early closure and impact
- Final individual performance appraisals
- Transition plan

UNIT VI – EVALUATE PROJECT MANAGEMENT TOOL/METHODOLOGIES

3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

6.8 Use the features of the latest tools used in project management

6.9 Explain the latest methodologies used in project management

6.10 Follow up and analyse trends and development

Content

To include but not limited to:

- Project management tools
  - Charting tools
  - Collaboration tools
  - Cloud based tools
- Project management methodologies
  - Agile project management
  - Remote team management

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ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Feedback will be in accordance with institutional policies

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role plays project and presentations.

CAPSTONE EXPERIENCE DESCRIPTION

Students will be given assignment using project management software and tools to plan, implement, and monitor projects

RESOURCES

Lecturer, Resource persons, models, Project Management Software and tools, materials, tools and equipment.

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	SUPERVISING RENEWABLE ENERGY OPERATIONS
COURSE CODE:	COSESREC2401
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 2, SEMESTER 3
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to effectively supervise and lead others in the workplace. Students will learn principles of leadership, management, personnel relationships, industrial relationships, conflict management and team work.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students are competent when they are able to:

1. Develop interpersonal skills
2. Become effective at influencing others
3. Accomplish goals and outcomes
4. Dealing with staff, peers, management, and other departments
5. Analyses own styles of behaviour
6. Evaluate own leadership styles
7. Develop flexibility to use various leadership styles

8. Explore ways to engage in productive resolution to conflicts debate
9. Lead and manage teams
10. Supervise work programmes of the organizations
11. Supervise staff
12. Create plans for staff development
13. Implement Quality Assurance Systems
14. Provide Quality Customer Services
15. Adhere to legislations, Regulations, Safety and Performance Standards

UNIT I: ORGANIZE, IMPLEMENT AND MONITOR WORK ACTIVITIES ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Read and interpret organisation's strategic goals, objectives and operational plans for company.

1.2 Share strategic planning information with staff to engage input and commitment.

1.3 Develop operational and staff personal work plans and obtain approval.

1.4 Schedule work plan activities in keeping with staff personal operational plan

1.5 Establish quality control plans for various components of the bakery department.

1.6 Delegate areas of responsibility to staff.

1.7 Establishing reporting periods for staff.

1.8 Operationalize work processes and activities.

1.9 Monitor staff activities.

1.10 Monitor process efficiency level.

1.11 Identify quality issues, bottlenecks, challenge and implement corrective action.

1.12 Evaluate work flows and correct problems necessary.

1.13 Adhere to legislation, OHS and other industry standards.

1.14 Address staff needs based on merits.

1.15 Implement maintenance schedule for equipment and tools.

1.16 Plan, organize and implement cleaning and sanitation programmes.

1.17 Prepare and maintain relevant documentations using Standard English.

1.18 Provide quality customer service.

Content

To include but not limited to:

- Organizations Strategic Plan
- Department Operational Plan
- Work Procedure and processes
- Policy Guideline
- Quality Polices
- Quality Control Procedures
- Types of work place records
- Control Systems
- Guidance Procedures
- Customer Service Polices

UNIT II – SUPERVISE OPERATIONS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

a. Develop, implement and monitor plan for operations.
b. Identify and select appropriate resources for operations.
c. Evaluate the layout of bakery faculties support effects work flow, make adjustments as necessary.
d. Deploy staff in keeping with work flow and resource availably.
e. Conducts need analyze for operations and recommend strategies for accommodation of resource, or operational charges.
f. Monitor production activities of to meet targets.
g. Employ Strategies to improve productively level and product quality.
h. Apply organization policies and procedures to resolve conflict and dissatisfaction.
i. Display professional and ethical behaviour.
j. Supervise the inflow of raw materials and commodities.
k. Set-up and monitor facilities for finished product inventories.

l. Follow regulations, legislations, and OHS in production activities.
m. Adhere to procedures to acquire inventories and to manage inventories.
n. Handle the orders and control of stocks.
o. Coordinate the use of information system and information flow.
p. Prepare and present work place documentations.
q. Use effective communication styles and techniques.
r. Provide effective leadership and quality customer service.

Content

To include but not limited to:

- Customer service:
  - Internal staff at all levels
  - Customer of all types
  - Suppliers
  - Distributors
- Information System
  - Communication Modes (email, memos, letter)
  - Internet
  - Telephone
  - Cell phone Usage
  - Teamwork and Team Leadership Styles
- Productivity levels
- Efficiency levels
- Organization Policies:
  - Staff relationship
  - Conflict Resolution
  - Employment and Employee relations safely

- Production control and Quality Assurance
- Purchasing and inventory

- Needs Analysis
- Layout of faculties
  - Equipment (including oven)
  - Working tables
  - Production flow
- Professional Ethics
- Delegation and Deployment of Staff
- Monitoring Activities:

- Staff performance
- Production
- Equipment and Tool Maintenance
- Safety and Sanitation

UNIT III – DEVELOP, LEAD AND MANAGE TEAMS ? HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Compare and Contrast leadership vs. Management.

3.2 Employ strategies to develop and makes competent members of work teams.

3.3 Adhere to principles and styles of effective leaders and leadership.

3.4 Use a variety of situational to provide good leadership example.

3.5 Prepare team members to perform leadership roles.

3.6 Encourage team members to be lifelong learners.

3.7 Use opportunities at work to train staff.

3.8 Encourage team members to transfer learning to each other.

3.9 Use role modelling techniques to motive and encourage team member to high performance.

3.10 Manage team's performance and productivity levels.

3.11 Manage conflict and grievance according to policies.

3.12 Read, interpret and apply labour laws to work activities.

3.13 Use appropriate leadership styles to minimize industrial relationship issues. Motive teams to achieve high performance.

3.14 Implement system to record acceptable behaviours and high performance/ high productivity.

Content

To include but not limited to:

- Strategies for development
  - Monitoring
  - Coaching
  - Training the job
  - Job notation
  - Delegation
  - Formal training off the job
- Types of Teams
  - Situational Teams
  - Problem Solving Teams
  - Work Teams
  - Team Leader (in training)
- Leadership Style
  - Situational
  - Authoritarian
  - Lassafaire
- Staff Motivation Strategies
- Labour laws/ Industrial Relations
- Role Modelling

ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be documented on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught through formal lectures, audio-visual aids, case studies research, projects, class and presentations.

MAJOR PROJECT

Students will prepare and host an exhibition on topic given.

RESOURCES

Required:

2. Supervisory Management, 8th and 9th Edition

3. Donald C. Mosley University of South Alabama
4. Don C. Mosley, Jr. University of South Alabama
5. Paul H. Pietri University of South Alabama
6. ISBN-10: 1285063007 | ISBN-13: 9781285063003
7. Kavanaugh, Raphael R., Ninemeier, Jack D. (2001) Supervision in the Hospitality Industry. 3rd Edition. Educational Institute – American Hotel and Motel Lodging Association.
8. King, Judy Z., Woods, Robert H. (2002) Leadership and Management in the Hospitality Industry. 2nd Edition. Educational Institute – American Hotel and Motel Lodging Association

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	PURCHASING AND INVENTORY CONTROL
COURSE CODE:	COSESPC2401
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 2, SEMESTER 3
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to purchase materials and equipment and control inventory.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students will be able toanalyze the purchasing methods of materials, equipment, etc, manage the purchasing process and examine methods of storing, receiving and issuing.

Upon completion of this course, students are competent when they are able to:

1 Identify and explain the factors that affect the purchasing materials and equipment.
2 Identify the various criteria as they relate to quality of materials and equipment.
3 Analyze the information listed on the labels for purchasing materials.
4 Describe the advantages and disadvantages involved in buying from various types of companies.
5 Identify the characteristics of purchasing agents.

6 Storage, packaging and distribution of materials

UNIT I – INTERFACE WITH PURCHASING AGENTS ? HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

1.1 Discuss the role and duties of the purchasing agent (job description)

1.2 Identify the attributes of a purchasing agent (job specification)

Content

To include but not limited to:

- Duties of the Purchasing Agent
- Profile of a Purchasing Agent

UNIT II – USE MECHANICS OF BUYING 6 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

a. Identify the steps involved in buying\
b. Differentiate between "selection" and "procurement"
c. Discuss the distribution channel
d. Explain the values added throughout the distribution channel (time, form, place, economics)

Content

To include but not limited to

- The buying process
- Selection and procurement
- Distribution channels

UNIT III – USE PRINCIPLES OF PURCHASING 6 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

3.1 Define "purchasing"

3.2 Discuss the 4 W's of purchasing

3.3 Identify ways in which materials and equipment can be obtained

3.4 Identify the two categories into which the types of materials may be purchased

3.5 Discuss the objectives of purchasing

3.6 Discuss problems related to purchasing

Content

To include but not limited to:

- Definition of "purchasing"
- 4 W's of purchasing
- Methods of purchasing food
- Problems related to purchasing

UNIT IV – IDENTIFY FACTORS AFFECTING THE PURCHASING ACTIVITIES 9 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

4.1 Define and explain terms used in purchasing

- Par stock
- Specification
- Requisitions
- Purchase order
- Expediting

4.2 Discuss the purchasing transaction

Content

To include but not limited to:

- Purchasing terminology

- Customer influences on the purchasing process
- Purchasing transactions

UNIT V – TYPES OF PURVEYORS 9 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

5.1 Identify the general categories of purveyors/suppliers

5.2 Discuss the legal points regarding choice of purveyors (tendering, etc)

5.3 Explain the function of purveyors

5.4 Outline the advantages and disadvantages of purchasing from various types of purveyors

5.5 Examine the steps in the selection of a purveyors/suppliers

Content

To include but not limited to:

- Categories of purveyors/suppliers
- Tendering
- Functions of a purveyor
- Selection of purveyors

UNIT VI: DETERMINE GRADES OF PRODUCTS (LOCAL AND INTERNATIONAL) 3 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

6.1 Identify grades used locally and internationally

6.2 Explain what is meant by "grades"

6.3 Distinguish between packer grades and government assigned grades

6.4 Discuss the characteristics to which grades refer (wholesomeness, appearance, color, uniformity)

6.5 Discuss government regulations related to the industry

6.6 Discuss government regulations in grades/grading (USDA, etc)

Content

To include but not limited to:

- The grading process
- Local and international legislation and regulation

UNIT VII: PURCHASING COMMODITIES 4 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

7.1 Explain the types of contracts used in purchasing groceries

7.2 Discuss purchasing by daily market list, quotation lists, cash and carry and paid reserve

7.3 Discuss purchase specifications for materials, tools, equipment

Content

To include but not limited to

- Contracts
- Market list
- Purchasing specification for commodities

UNIT VIII – ORGANIZE AND MONITOR STOREROOM 9 HOURS

Specific Objectives

Upon successful completion of this unit, students are competent when they are able to:

8.1 Identify times that stock taking should occur and who is responsible for its undertaking

8.2 Discuss the importance of stock taking

8.3 Use formula to establish the rate of stock turnover

8.4 Explain the steps involved in managing a storeroom from receipt to issuance

8.5 Discuss cost analysis, stock levels and "Pareto Analysis"

8.6 Discuss the importance storage

8.7 Apply stores control procedures and use relevant documents

8.8 Explain the storeroom control procedure and its purpose

Content

To include but not limited to:

- Stock taking procedures
- Receipt and issuing
- Stock levels
- Temperature control
- Documentation
- Storeroom control procedures
- Safety while storing materials

ASSESSMENT PROCEDURES

ASSESSMENT PROCEDURES

Students will take responsibility for their own academic achievement. Students will demonstrate their commitment to their own goal of educational advancement by attending classes, completing assigned work, and complying with existing copyright legislations. To successfully complete this course, a student must pass **ALL** the different components of the course.

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no

longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, practical demonstration, case studies and presentations.

RESOURCES

Required Text:

1. ???????

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	USING EMPLOYABILITY SKILLS
COURSE CODE:	COSEES2401
COURSE HOURS:	45 HOURS
CREDIT VALUE:	3
PREREQUISITES:	NONE
YEAR/SEM.:	YEAR 2, SEMESTER 4
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

COURSE DESCRIPTION

This course is designed to enable students to develop the requisite knowledge, skills and attitudes to use employability skills to develop professionalism.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

Upon completion of this course, students will be able to incorporate a multi-faceted approach in fostering the necessary skills and attributes that will be needed to meet and exceed personal and professional standards within the Energy Sector.

Upon successful completion of this course, students are competent when they are able to:

1. Develop an awareness of key fundamental steps in identifying their career journey
2. Display an awareness of professional standards and principles that guide their development

3. Demonstrate a working knowledge of the interpersonal skills needed by a professional employees within the renewable energy sector
4. Develop the competences required in managing change within the organization and industry and
5. Design a plan for professional and personal development through self-assessment

UNIT I: PLAN PROFESSIONAL DEVELOPMENT 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Define the scope of Professional Development

1.2 Recognize the importance of Professional Development

1.3 Define who is a Professional

1.4 Identify Key skills/characteristics and core values of a professional

1.5 Discuss the importance of being a life-long learner

Content

To include but not limited to:

- Definition of Professional Development
- Importance of Professional Development
- Definition of a Professional
- Key skills/characteristics of a Professional
- Innate vs. Learnt Behaviour
- Core Values vs. Beliefs
- Evaluation of traits and habits of successful business persons
- Life-Long Learner

UNIT II – ADHERE TO PROFESSIONAL STANDARDS 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1 Identify the professional standards of the sector.

2.2 Demonstrate awareness in the practices involved in professional development.

Content

To include but not limited to:

- Ability, Attitude and Aptitude
- Principles to guide the quest for Professional Development - Great Respect And Consideration for Everyone (G.R.A.C.E), Treating others as you would want to be treated etc.
- Industry standards for Tourism, Hospitality & Culinary Arts & Production

UNIT III – ANALYZE AND DISCOVER SELF 2 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Assess current status in their personal & professional development

3.2 Undertake personal S.W.O.T Appraisal

3.3 Suggest techniques to improve identified weaknesses and threats

Content

To include but not limited to:

- Who am I?
- What do I really want to do
- S.W.O.T Analysis
- Aptitude Assessment

UNIT IV – IMPLEMENT CAREER DEVELOPMENT PLANS AND GOALS 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

4.1 Recognize the importance of Goal Setting

4.2 Create S.M.A.R.T Goals linked to their Career Development Process

4.3 Identify what needs to be done in completing their career development process

Content

To include but not limited to:

- Definition of Goal Setting
- Classification of the acronym S.M.A.R.T
- Career Development Process

UNIT V: APPLY BUSINESS ETIQUETTE, PROTOCOL AND GROOMING 6 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

5.1 Demonstrate good business etiquette

5.2 Demonstrate confidence in all aspects of dining etiquette

5.3 Apply the techniques for dressing on a budget

5.4 Recognize the importance of employing proper grooming

Content

To include but not limited to:

- Business etiquette
- Dining etiquette
- Executive presence
- First Impressions
- Dressing on a Budget
- Grooming

UNIT VI: MANAGE CHANGE 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

6.1 Recognize the dynamic nature of renewable energy sector

6.2 Demonstrate behaviour required to managing change

6.3 Explore the various ways employees respond to the changing work environment

6.4 Recognize and adapt to the diversity within the work place

Content

To include but not limited to:

- Stress Management and Techniques
- Time Management and Techniques
- Emotional Intelligence
- Management Styles
- Understand the corporate culture
- Diversity - Gender - Race - Ethnicity - Sexual Orientation - Religion

UNIT VII– PRACTICE BUSINESS COMMUNICATION 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

7.1 Identify the key elements of writing a successful Resume & Cover Letter

7.2 Design a Resume & Cover Letter

7.3 Recognize the differences in written communication

7.4 Recognizing the Communication Process and Chain of Command of Organization:

7.5 Use principles that guide Audio Visual Presentations

Content

To include but not limited to:

- Communication
- Resume Writing
- Cover Letters
- Written Communication - memorandums, speeches emails etc
- Oral presentations
- Audio visual presentations

UNIT VIII– BUILD PERSONAL BRAND 3 HOURS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

8.1 Recognize that each individual is a brand

8.2 Identify ways in which to facilitate continuous self- improvement

8.3 Recognize the importance of Networking: face-to-face & social media – LinkedIn etc.

8.4 Discuss the importance of Financial Management

Content

To include but not limited to:

- Individual as a Brand
- What are my unique selling points?
- Marketing yourself as a brand
- Social Media
- Networking
- Cover Letters

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ASSESSMENT PROCEDURES

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On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1	**I, II, III,**	Oral Assignment	20%
2	**IV, V**	Written Assignment	20%
3	**VI, VII, VIII**	Group Project	40%
4	**IX, X**	Written	20%
Total			**100%**

ASSESSMENT

The assessment for this course takes the form of:

Participation	5%
Field Assessment	15%
Job Interview	15%
Business Meeting	15%
Journal Entries	10%
Presentations	10%
Executive Portfolio	30%

FEEDBACK

Students will be given rubrics and grading schemes within the first contact period of the course. Each student will also be given written and oral feedback. Feedback will be immediate and no longer than one week after a task is assessed. Feedback may be document on assessment evidence.

INSTRUCTIONAL METHODS

This course will be taught using a combination of formal lectures, discussions, role plays, case studies and presentations.

RESOURCES

Required:

Suggested Reading:

Human Resource demand:

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	MAJOR CAPSTONE PROJECT
COURSE CODE:	COSEMCP 2401
COURSE HOURS:	45 HOURS
CREDIT VALUE:	1
PREREQUISITES:	ALL COURSE COMPLETED
YEAR/SEM.:	YEAR 2, SEMESTER 4
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

CAPSTONE EXPERIENCE DESCRIPTION

This major capstone experience is intended to give students the opportunity to integrate the total body of learning experiences gained throughout the program duration. Students will be required to use knowledge, skills and aptitude acquired to design, develop, and prepare implementation strategies for the project assignments indicated here under.

The student will select one of following project assignment they will:

Assignment 1. Identify and select an organization in which they will plan, organize and energy audit.

Scope of assignment activities

1. Develop formal relationship with an organization and obtain permission to conduct an energy audit of their organization.
2. Develop audit scope and plan
3. Conduct research on the company (Ownership, staffing, systems, nature of business and so on)
4. Assemble and train audit team
5. Appoint lead auditor

6. Schedule audit activities
7. Obtain companies approval of audit plans and schedules
8. Assign audit responsibility team members
9. Prepare audit documentation/materials
10. Plan and schedule audit briefing meeting with host company representatives
11. Conduct audits, collect audit data, analyse data, prepare findings
12. Conduct de-briefing meeting with host company and communicate findings and recommendations
13. Prepare and submit formal audit reports and recommendation to host company
14. Develop follow-up monitoring plan for implementation
15. Develop budget for audit activities
16. Audit documentation and reports are prepare using standard English

Assignment 2. Research different types of Renewable systems being implemented in Jamaica, select from amongst one of the following renewable energy sources, develop and design a renewable energy project for:

- A commercial company
- An industrial company
- A residential property

The renewable energy from which a choice is to be made are:

- Wind
- Solar
- Thermal
- Biogas
- Biofuel

Scope of assignment activities

1. Justify reasons for the choice made in terms of the renewable energy and the types of facilities

2. Indicate their knowledge of issues impacting on the environment and the ways in which renewable energy can provide solution to environmental imbalances
3. Posit on the implication of renewable energy sources on the economy and social imperatives
4. Prepare detail drawings and/or specification for project selected
5. Develop resource plans
6. Develop budgets associated with plans
7. Prepare project management strategic plans
8. Develop project schedules for implementation
9. Present research data on project activities selected for development
10. Prepare reports using standard English

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ASSESSMENT PROCEDURES

Students are required to select an assignment. Prepare a proposal for execution of the assignment selected and discuss with lecturer or advisor. The assessment factors for consideration are:

- Use of group activities where applicable.
- Planning an organization of assignment activities
- Use of supporting research available on the particular subject matter
- Technical content, completeness, logics and factual data
- Form of documentation, writing styles and use of grammar
- Use of drawings and other specifications

The institutions assessment policies and procedures in regard to research and or thesis and any other related assessment requirement will be re-enforced

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	ACQUIRING PROFESSIONAL AND INDUSTRY RECOGNITIONS
COURSE CODE:	COSAPIR 2401
COURSE HOURS:	45 HOURS
CREDIT VALUE:	1
PREREQUISITES:	COMPLETION OF YEAR TWO COURSES
YEAR/SEM.:	YEAR 2, SEMESTER 4
APPROVED BY:	CENTRE OF OCCUPATIONAL STUDIES

PROGRAMME DESCRIPTION

This Professional Recognitions Development Programme is designed to provide the students with the opportunity to pursue professional and industrial recognitions' programmes which will lead them acquiring professional and or industry certification, licenses' or licensure. These types of recognitions will in addition, to their educational and or training institutional certification gives them a high level of employment standing and competitiveness in their sector of employment and career paths.

The student should be assigned a workplace mentor and or programme advisor who will facilitate and guide the student's goal achievements towards professional recognitions. The students should be encouraged to commence these pursuits before the completion of their course of study

PROGRAMME OBJECTIVES COMPETENCY OUTCOME

The recognitions programme is integral to the implementation of the delivery of the Fitness Management Programme. Institutions are encouraged to use creative strategies in administering its implementation. There are varieties of teaching and learning modalities that may be used in attaining the programme's objectives.

The programme objectives are:

1. Expose students to the need for accuracy professional and/or industry recognitions
2. Enhance students understanding of the social-economic and cultural impacts of Professional and Industrial Recognitions.
3. Develop in students professional ethics, business protocols good personality traits, habits and professionalism
4. Pursue Professional Recognitions as part of their life-long learning strategies
5. Use Professional Recognitions to continuously improve work processes, productivity and value creation.
6. Use Professional Recognitions for competitive advantages in the workplace.
7. Comply with legislations, regulations and related conventions governing occupational professional practices.
8. Recognize the aims of Professional Recognitions on the public's health, safety and security
9. Recognize the intent of Professional Recognitions to enhance compliance with requirements of the Fair Trading Act, Consumer Protection Act, and the provision of Quality Customer Services.
10. Recognize the becoming involved in Voluntarism.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES:

Upon completion of this attachment programme students will be able to relate to concepts, theories and techniques, which are studied, to develop and practice a range of technical competencies, personal competencies and social competencies; help students to identify and develop career paths with in their industry. It will also encourage students to develop important employability skills make contacts with potential employers and to construct work experience profiles commensurate with the demands of future employers and or explore entrepreneurial opportunities.

Upon successful completion of this attachment programme, students are competent when they are able to:

1. Practice theoretical principles.
2. Follow work instructions.
3. Adhere to organizations policies
4. Comply with relevant legislations, regulations and codes of practices
2. Comply with safety requirements
3. Acquire/develop competencies in their occupational area.
4. Apply procedures for work processes.
5. Analyze work plans and implement as instructed
6. Manage area of specialization.
7. Plan, organize and implement tasks/assignments according to given instructions and or procedures.
8. Work effectively as part of a team.
    - Practice employability skills on the job.
    - Be productive, efficient, effective, cost controlled and quality focused
    - Provide excellent customer service
    - Adhere to Dress Codes and Interpersonal Relations Standards
    - Conduct research industry trends, document lessons learned, prepare career development plan, prepare and submit report

UNIT I: VALUE THE ROLE OF REGULATORS AND PROFESSIONAL ORGANZIATIONS IN PROFESSIONAL/INDUSRTIAL RECOGNITIONS

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Analyze the role of professional organizations and regulations in professional and industrial recognitions

1.2 Determine the impact of professional/ industrial recognitions on socio-economic and cultural variables

1.3 Recognize the value of regulations in achieving societal and/or commercial objectives

1.4 Recognize the function of various organizations involved in Health and Wellness

1.5 Recognize the functions of various government agencies responsibility for Health and Wellness

1.6 Analyze the potential impact of Professional and Industry Certification

Content

To include but not limited to:

- Legislations, regulation and policies relating to Renewable Energy Sector and other related Sectors and encompassing:
  - Management System Certification ISO 5001:20011
  - Health and Wellness Policies
  - Ministry of Health
  - Ministry of Education
  - Licensing Requirements for Fitness Professionals
- Local, Regional and Internationally Fitness/Wellness Organizations
- Local, Regional and International Professional Certification
- Local, Regional and International Fitness Competitions
- Jamaica Body Builders Association

UNIT II: ACQUIRE PROFESSIONAL RECOGNITION FOR INDUSTRIAL PRACTICE

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

2.1 Explain the importance of having professional recognition for industry practice

2.2 Identify and differentiate types of professional/ industry recognitions

2.3 Seek and determine requirements for professional/industry recognitions

2.4 Enroll in training programmes for professional/industry recognitions

2.5 Access and complete programs of study for professional/ industry recognitions

2.6 Apply to appropriate awarding bodies for registration and professional/industry recognitions

2.7 Adhere to professional ethics code of preface and quality of service requirements of the recognition

2.8 Adhere to recertification requirements

Content

To include but not limited to:

Types of recognitions

- Licensing
- Permits
- Licensure ship
- Industry awards
- ISO certification
- Other international recognitions/awards
- Other local recognitions/awards

- Recognition Awarding Bodies:

South West University	Fitness Certification
	Certified Fitness Instructor
University of Texas at Austin	Leadership in Sport, Fitness and Wellness
University of Florida	Certification in Fitness Management
CompTIA	Project Management
CEFF for	Entrepreneurship

UNIT III: ACQUIRE TRAINING AND OR RECOGNITION IN APPLY FIRST AID

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

3.1 Explain the importance of applying first aid

3.2 Adhere to the principle of first aid when addressing issues requiring first aid

3.3 Acquire first aid training and certification

3.4 Follow procedures in applying first aid techniques

3.5 Evaluate situation above own competence level and seek appropriate assistance and seek appropriate assistance

3.6 Contact relevant to authorities in event of serious emergencies

3.7 Report and/or document incidents/accidents and actions taken

3.8 Follow up with persons who have had first aid treatment and/or resolution to their problems

Content

To include but not limited to:

- Basic first aid procedure
- Sources of assistance
- Company nurse/doctor
- Employees with first aid training/certification
- Emergency Agencies:
  - Fire brigade
  - Police
  - Ambulance/ Paramedics
  - First Aid procedures
- Red Cross of Jamaica Training and Certification Programmes: CPR/First Aid Certification

UNIT IV: PARTICIPATE IN ACTIVITIES OF PROFESSIONAL ORGANIZATION

Specific Objectives

Upon completion of this unit, students are competent when they are able to:

1.1 Conduct research on professional organization of interest
1.2 Interview person having connections with the particular organization.
1.3 Analyze data/information obtained on organization of interest
1.4 Evaluate the compatibility level of own professional goals with that of the organization.
1.5 Collect information on procedures for membership in the organization
1.6 Apply for membership in organization of interest
1.7 Participate and contribute to the activities of the organization of interest
1.8 Take opportunities to exchange learning with other members
1.9 Take actions to grow and develop professional internally and externally to the organization
1.10 Transfer knowledge gained from association with the organization to the workplace and other colleagues

Content

To include but not limited to:

- Research on organization:

- Vision. Mission and Goals
- Membership categories (Full, Associate, Affiliate, Students)
- Professional Development Programmes
- Fee Structure
- Application Procedures
- Programme of Activities
- Organization Structure

- Transfer of Learning
- Life Long Learning Opportunities
- Compatibility Evaluation

UNIT V: BUILD PROFESSIONAL RECOGNITION THROUGH VOLUNTARISM

Specific Objective

Upon completion of this unit, students are competent when they are able to:

5.1 Investigate the role of voluntarism in developing communities

5.2 Explore the roles of voluntarism building and developing competencies

5.3 Investigate voluntarism as a vehicles for transfer of leering and life category

5.4 Use voluntarism to develop appropriate values and attributes

5.5 Interview person who have been awarded natural honors for voluntarism and public service

5.6 Identify and acquire critical knowledge, skills and attributes through voluntarism

5.7 Use voluntarism to seek motivation and inspiration of others

5.8 Prepare and present report on voluntary project/activities

Content

To include but not limited to:

- Role of voluntarism
  - Building
  - Building personal, social and technical competencies
- Interview National Awardees
- Acquire knowledge skills and attributes
  - socio-cultural skills

- leadership skills
- economic skills
- Organizational Skills
- Negotiation Skills
- Mediation skills
- Historical knowledge
- Counseling skills
- Social justice

- Motivational and Inspirational Group
  - Youths
  - Young adults
  - Adults
- Development Nature of Voluntarism
- Benefits of Voluntarism
- Values and Attitudes
- Love of Country
- Self-Empowerment
- Gleaner Annual National Award for Voluntarism

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On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
1		Student Daily Logs	10%
2		Appraisal by employer and tutor	20%
3		Written report on experience	100%
4		Hands-on Experience	60%
Total			**100%**

FACULTY OF COMPUTER SCIENCE AND ENGINEERING	
PROGRAMME:	OCCUPATIONAL ASSOCIATE DEGREE IN RENEWABLE ENERGY TECHNOLOGY
COURSE NAME:	INTERNSHIP/EXTERNSHIP (WORK PLACE ATTACHMENT)
COURSE CODE:	
COURSE HOURS:	240 HOURS
CREDIT VALUE:	1
PREREQUISITES:	COMPLETION OF YEAR 1 COURSES
YEAR/SEM.:	YEAR 1, SEMESTER 1

COURSE DESCRIPTION

This Externship/Work Place Attachment Programme is designed to provide the students with industrial /business placement commensurate with their chosen career. The placement is 240 hours in duration and is intended to give students on-the-job experience appropriate to their occupational area(s) of study. During this period the students are to receive at least one visit from the Tutor and or the Programme Coordinator/Advisor. The student should be assigned a workplace mentor who will facilitate the student's integration into and work experiences in the organization.

LEARNING OUTCOMES AND INSTRUCTIONAL OBJECTIVES

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9 Manage area of specialization.
10 Plan, organize and implement tasks/assignments according to given instructions and or procedures.
11 Work effectively as part of a team.
12 Practice employability skills on the job.
13 Be productive, efficient, effective, cost controlled and quality focused
14 Provide excellent customer service
15 Adhere to Dress Codes and Interpersonal Relations Standards
16 Conduct research industry trends, document lessons learned, prepare career development plan, prepare and submit report

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ASSESSMENT

On-going Assessment Requirements			
No.	**Suggested Unit/Unit Cluster**	**Assessment Strategy**	**Weight**
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2		Appraisal by employer and tutor	20%
3		Written report on experience	100%

4		Hands-on Experience	60%
Total			**100%**

MINISTRY OF EDUCATION,
YOUTH & INFORMATION

Centre of Occupational Studies

DEVELOPING. ALIGNING. SUSTAINING. ADVANCING.

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