Course Description:

This is an exploratory and introductory course which leads to a **RAC Servicing** National Certificate Level II (NC II). It covers **five** common competencies that a **Grade 7/Grade 8** Technology and Livelihood Education (TLE) student ought to possess: (1) using tools, equipment and paraphernalia; (2) performing mensuration and calculation; (3) practicing Occupational Health and Safety (OHS) procedures; (4) maintaining tools, equipment and paraphernalia; and (5) interpreting technical drawing and plans.

The preliminaries of this exploratory course include the following: (1) discussion on the relevance of the course, (2) explanation of key concepts relative to the course, and (3) exploration of career opportunities.

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
 Introduction Basic concepts in RAC Servicing Relevance of the course Career opportunities 	The learner demonstrates an understanding of the basic concepts and underlying theories in RAC servicing.	The learner independently demonstrates common competencies in RAC servicing as prescribed by TESDA Training Regulations	 Explain basic concepts in RAC servicing Discuss the relevance of the course Explore on opportunities for RAC servicing as a career 	
PERSONAL ENTREPRENEUR	IAL COMPETENCIES (PeCS)		
1. Assessment of Personal Entrepreneurial Competencies and Skills (PeCS) vis-à-vis a practicing entrepreneur/employee 1.1 Characteristics 1.2 Attributes 1.3 Lifestyle 1.4 Skills 1.5 Traits 2. Analysis of one's PeCS	The learner demonstrates an understanding of one's Personal Entrepreneurial Competencies and Skills (PeCS).	The learner recognizes his/her Personal Entrepreneurial Competencies and Skills (PeCS) and prepares a list of PeCS of a practitioner/entrepreneur in RAC.	LO 1. Recognize Personal Entrepreneurial Competencies and Skills (PeCS) needed in RAC 1.1 Assess one's PeCS: characteristics, attributes, lifestyle, skills, traits 1.2 Assess practitioner's: characteristics, attributes, lifestyle, skills, traits 1.3 Compare one's PeCS with that of a practitioner /entrepreneur	TLE_PECS7/8-0k-1

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
ENVIRONMENT AND MARKE	T (EM)			
 Key concepts of Environment and Market Products & services available in the market Differentiation of products and services Customers and their buying habits Competition in the market SWOT Analysis 	The learner demonstrates an understanding of the concepts environment and market that relates to a career choice in RAC.	The learner independently generates a business idea based on the analysis of environment and market in RAC.	LO 1. Generate a business idea that relates with a career choice in RAC 1.1 Conduct SWOT analysis 1.2 Identify the different products/services available in the market 1.3 Compare different products/services in RAC business 1.4 Determine the profile potential customers 1.5 Determine the profile potential competitors 1.6 Generate potential business idea based on the SWOT analysis	TLE_EM7/8-0k-1
LESSON 1: PREPARE MATE	RIALS AND TOOLS (UT)			
Tools and materials for RAC Servicing	The learner demonstrates an understanding of the concepts in the preparation of RAC materials and tools using the different forms in RAC.	The learner independently prepares appropriate RAC materials and tools using the different forms in RAC based on industry standards.	LO1. PREPARE RAC MATERIALS AND TOOLS FOR THE TASK 1.1 Prepare a list of electrical tools and materials for a specific job LO2. REQUEST APPROPRIATE RAC SUPPLIES MATERIALS AND TOOLS APPLICABLE TO A SPECIFIC JOB 2.1 Use the appropriate form in requesting for electrical tools, supplies and materials for a specific job LO3. RECEIVE AND INSPECT RAC SUPPLIES, MATERIALS AND TOOLS 3.1 Check and inspect received items on the list	TLE_IARA7/8UT-0a-1 TLE_IARA7/8UT-0a-2 TLE_IARA7/8UT-0b-3

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE	
LESSON 2: PERFORM MENSURATION AND CALCULATION (MC)					
 Measuring instrument Measurement and calculation Unit Conversion System of measurement English Metric 	The learner demonstrates an understanding of the concepts and underlying principles in performing measurements and calculations.	The learner independently performs accurate measurements and calculation based on given tasks.	 LO1. SELECT ELECTRICAL MEASURING TOOLS AND INSTRUMENTS 1.1 Identify object or component to be measured. 1.2 Choose measuring tools to be used for specific tasks 1.3 Identify alternative measuring tools without sacrificing cost and quality of work. LO2. CARRY OUT MEASUREMENTS AND CALCULATIONS 2.1 Use appropriate measuring devices for specific tasks 2.2 Compute for required data. 2.3 Convert data to its equivalent measure 	TLE_IARA7/8MC-0c-1 TLE_IARA7/8MC0-d-2	
LESSON 3: INTERPRET TECH	HNICAL DRAWINGS AND PI	LANS (ID)			

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
Sign, symbols and data Interpret technical drawings and plans Freehand sketching	The learner demonstrates an understanding of the concepts and underlying principles in interpreting simple technical drawings and plans in RAC.	The learner independently reads and interprets specifications of simple technical drawings and plans.	LO1. ANALYZE SIGNS, RAC SYMBOLS AND DATA 1.1 Read and interpret RAC signs, symbols and data 1.2 Analyze RAC components and materials based on electrical signs, symbols and data LO2. INTERPRET TECHNICAL DRAWINGS AND PLANS 2.1 Read blueprints of RAC plans, diagrams and circuits 2.2 Identify necessary tools, materials and equipment according to blueprints of RAC plans, diagrams and circuits	TLE_IARA7/8ID-0e-1 TLE_IARA7/8ID-0f-2
LESSON 4: MAINTAIN TOOL	S AND FOLITPMENT (MT)	1		

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
1. Checking tools and equipment 2. Maintenance of tools and equipment 2.1 Cleaning 2.2 Lubricating 2.3 Tightening 2.4 Simple tool repair 2.5 Hand sharpening 3. Storing tools and equipment	The learner demonstrates an understanding of the underlying principles in the maintenance of RAC tools and equipment.	The learner independently performs proper maintenance of RAC tools and equipment based on industry standards.	LO1. CHECK CONDITION OF TOOLS AND EQUIPMENT 1.1 Label functional and non-functional tools and equipment LO2. PERFORM BASIC MAINTENANCE 2.1 Perform cleaning and lubricating of tools 2.2 Observe periodic preventive and maintenance of RAC tools and equipment 2.2.1 Sharpening 2.2.2 Oiling 2.2.3 Insulating LO3. STORE TOOLS AND EQUIPMENT. 3.1 Prepare inventory of tools and equipment 3.2 Store tools and equipment in their proper places	TLE_IARA7/8MT-0g-1 TLE_IARA7/8MT-0h-2 TLE_IARA7/8MT-0h-3
LESSON 5: PERFORM HOUS	EKEEPING AND SAFETY PR	ACTICES FOR RAC SERVICING (OS)	
 Proper house keeping Hazards in the work area Flammable materials Running machinery/equipment Toxic substances Debris Open flames Loose objects/fixtures Chemicals Electrical faults Hot metals 	The learner demonstrates an understanding of the concepts and underlying principles fof occupational health and safety procedures.	The learner independently simulates occupational health and safety procedures.	LO1. IDENTIFY HAZARDS AND RISKS 1.1 List down hazards and risks in the workplace LO2. CONTROL HAZARDS AND RISKS 2.1 Determine effects of hazards and risks 2.2 Evaluate hazards and risks 2.3 Follow procedure for controlling hazards and risks in the workplace LO3. PRACTICE OHSP	TLE_IARA7/80S-0i- TLE_IARA7/80S-0i- TLE_IARA7/80S-0j- 3

Course Description:

This is a specialization course which leads to a **RAC Servicing** National Certificate Level I (NC I). It covers two (1) core competencies that the **Grade 9** Technology and Livelihood Education (TLE) student ought to possess: (1) domestic refrigeration and air-conditioning unit installation, and (2) service and maintainance of window-type air-conditioning / domestic refrigeration units.

The preliminaries of this specialization course include the following: (1) discussion on the relevance of the course, (2) explanation of key concepts relative to the course, and (3) exploration of career opportunities.

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
 Introduction Basic principles of electricity and mechanical aspects of refrigeration unit Relevance of the course Career opportunities 	The learner demonstrates an understanding of the basic principles of electricity and mechanical aspects of refrigeration and air conditioning unit.	The learner independently demonstrates core competencies in RAC servicing as prescribed by TESDA Training Regulations	 Explain basic principles of electrical and mechanical aspects of domestic refrigeration unit Discuss the relevance of the course Explore career opportunities in RAC servicing 	
PERSONAL ENTREPRENEURI	AL COMPETENCIES (PeCS)			
 Assessment of Personal Competencies and Skills (PeCS) vis-à-vis a practicing entrepreneur/ employee in locality/town. 1.1 Characteristics 1.2 Attributes 1.3 Lifestyle 1.4 Skills 1.5 Traits Analysis of PeCS in relation to a practitioner Align, strengthen and develop ones PeCS based on the results 	The learner demonstrates an understanding of one's Personal Competencies and Skills (PeCS) in RAC.	The learner recognizes his/her Personal Entrepreneurial Competencies and Skills (PeCS) and prepares an activity plan that aligns with that of a practitioner/entrepreneur in RAC	LO 1. Recognize Personal Entrepreneurial Competencies and Skills (PeCS) needed in RAC 1.1 Assess one's PeCS: characteristics, attributes, lifestyle, skills, traits 1.2 Assess practitioner's: characteristics, attributes, lifestyle, skills, traits 1.3 Compare one's PECSS with that of a practitioner /entrepreneur 1.4 Align one's PECSS with that of a practitioner/entrepreneur	TLE_PECS9-Ik-1

Prerequisite: Grade 9 RAC

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
ENVIRONMENT AND MARKET	Г (ЕМ)			
Market (Town) 1. Key concepts of Market 2. Players in the Market (Competitors) 3. Products & services available in the market	The learner demonstrates an understanding of the concepts environment and market in RAC, particularly in one's town/municipality.	The learner independently creates a business vicinity map reflective of the potential RAC market within the locality/town.	LO 1. Recognize and understand the market in RAC 1.1 Identify the players/ competitors within the town 1.2 Identify the different products/services available in the market	TLE_EM9-Ik-1
Market (Customer) 4. Key concepts in Identifying and Understanding the Consumer 5. Consumer Analysis through: 1.1 Observation 1.2 Interviews 1.3 Focus group discussion (FGD) 1.4 Survey			LO 2. Recognize the potential customer/market in RAC 2.1 Identify profile of potential customers 2.2 Identify the customer's needs and wants through consumer analysis 2.3 Conduct consumer/market analysis	TLE_EM9-IIk-2
6. Generating Business Idea 6.1 Key concepts in Generating Business Ideas 6.2 Knowledge, Skills, Passions and Interests 6.3 New applications 6.4 Irritants 6.5 Striking ideas (new concept) 6.6 Serendipity Walk			LO 3. Create new business ideas in RAC business by using various techniques 3.1 Explore ways of generating business idea from ones' own characteristics/attributes 3.2 Generate business ideas using product innovation from irritants, trends and emerging needs 3.3 Generate business ideas using Serendipity Walk	TLE_EM9-IIIk-IVk-3

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
				0021
LESSON I: INSTALL DOMES	FIC REFIRGERATION AND AIR-	CONDITIONING ONLY (60 HOURS	(1R)	
CONTENTS: 1. Dom RAC Installation Requirements 1.1 Air circulation/ventilation requirements 1.2 Drain disposal requirements 1.3 Power supply requirements 1.4 Structural and architectural requirement 1.5 Provision for serviceability 2. Tools equipment and materials needed in installing DomRAC 3. Survey Inspection Report	The learner demonstrates an understanding of the concepts, underlying theories and principles in installing domestic refrigeration and air-conditioning units.	The learner independently provides quality, competitive and profitable service in installing domestic refrigerator and airconditioning units.	LO1. CONDUCT SURVEY FOR UNIT INSTALLATION 1.1 Assess site conditions and installation according to the job requirements 1.2 Determine tools, equipment and materials needed for installation according to site conditions and site installation requirements. 1.3 Record result of the survey on site condition and site installation	TLE_IARA9IR-Ia-c-1
 CONTENTS: Wires and cables used in electrical wiring Classes of outlet/switch boxes used in electrical wiring (PEC) Enclosure and their conditions for use Types of devices used in electrical wiring Identifying wall plugs and masonry bolts Drilling into masonry using portable electrical drill 			LO2. INSTALL ELECTRICAL CIRCUIT 2.1 Perform roughing-in activities according to appropriate provision in Philippine Electrical Code (PEC). 2.2 Select electrical cabling and wiring devices of correct load carrying capacity 2.3 Install electrical cabling and wiring devices in line with manufacturer's instructions 2.4 Install power wiring devices in accordance with the PEC 2.5 Test electrical circuit in accordance	TLE_IARA9IR-Ia-IIj- 2

		IRIAL ARTS - RAC SERVICING (1	
CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
10. Marking out using spirit level /water level11. Use of electrical measuring instruments12. Testing electrical circuits			with PEC	
CONTENTS: 13. Refrigeration cycle 14. Aircon/Refrigerator components and accessories 15. Sealant and insulation 16. Fastening device 17. WAC installation procedure 18. Basic plumbing 18.1 Types of PVC drain pipes 18.2 Types of PVC fittings 19. Safety practices			 LO3. INSTALL WINDOW TYPE AIRCON 3.1 Prepare unit and equipment/components based on work procedures 3.2 Install bracket, hangers and frames in accordance with manufacturer's recommendation. 3.3 Position and level unit in line with manufacturer's instructions 3.4 Install sealing materials to ensure an air tight seal around the unit following manufacturer's instructions 3.5 Install condensate drain according to manufacturer's recommendation 3.6 Employ safe manual handling techniques in line with enterprise OH&S procedures 3.7 Perform proper housekeeping (5S) 	TLE_IARA9IR-IIIa-IVj-3

GRADE 10 (Specialization)

Course Description:

This is a specialization course which leads to a **RAC Servicing** National Certificate Level I (NC I). It covers two (2) core competencies that the **Grade 10** Technology and Livelihood Education (TLE) student ought to possess: (1) domestic refrigeration and air-conditioning unit installation, and (2) service and maintainance of window- type air-conditioning / domestic refrigeration units

The preliminaries of this specialization course include the following: (1) discussion on the relevance of the course, (2) explanation of key concepts relative to the course, and (3) exploration of career opportunities.

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
 Introduction Basic principles of electricity and mechanical aspects of refrigeration unit Relevance of the course Career opportunities 	The learner demonstrates an understanding of the basic principles of electricity and mechanical aspects of refrigeration and air conditioning unit.	The learner independently demonstrates the core competencies in RAC servicing as prescribed by TESDA Training Regulations	 Explain basic principles of electrical and mechanical aspects of domestic refrigeration unit Discuss the relevance of the course Explore career opportunities in RAC servicing 	
PERSONAL ENTREPRENEURIA	L COMPETENCIES (PeCS)			
 Assessment of Personal Competencies and Skills (PeCS) vis-à-vis a practicing entrepreneur/employee in a province. 1.1 Characteristics 1.2 Attributes 1.3 Lifestyle 1.4 Skills 1.5 Traits Analysis of PeCS in relation to a practitioner Strengthening and further development of one's PeCS 	The learner demonstrates an understanding of one's Personal Competencies and Skills (PeCS) in RAC.	The learner independently creates a plan of action that strengthens/ further develops one's PeCS in RAC.	LO 1. Develop and strengthen personal competencies and skills (PeCS) needed RAC 1.1 Identify areas for improvement, development and growth 1.2 Align one's PeCS according to his/her business/career choice 1.3 Create a plan of action that ensures success of his/her business/career choice	TLE_PECS10-Ik-8

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
ENVIRONMENT AND MARKET	(EM)			
 Product Development Key concepts in developing a product Finding Value Innovation 4.1 Unique Selling Proposition (USP) 	The learner demonstrates an understanding of the concepts environment and market in RAC, particularly in one's town/municipality.	The learner independently creates a business vicinity map reflective of the potential RAC market within the locality/town.	LO 1. Develop a product/ service in RAC 1.1 Identify what is of "Value" to the customer 1.2 Identify the customer 1.3 Explain what makes a product unique and competitive 1.4 Apply creative and innovative techniques to develop a marketable product 1.5 Employ a Unique Selling Proposition (USP) to the product/service	TLE_EM10-Ik-IIk-1
Selecting a Business Idea Key concepts of Selecting a Business Idea 2.1 Criteria 2.2 Techniques			LO 2. Select a business idea based on the criteria and techniques set 2.1. Enumerate various criteria and steps in selecting a business idea 2.2. Apply the criteria/steps in selecting a viable business idea 2.3. Determine a business idea based on the criteria/techniques set	TLE_EM10-IIIk-2
7. Branding			LO 3. Develop a brand for the product 3.1 Identify the benefits of having a good brand 3.2 Enumerate recognizable brands in the town/province 3.3 Enumerate the criteria for developing a brand 3.4 Generate a clear appealing product brand	TLE_EM10-IVk-3

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
INSTALL DOMESTIC REFIRGER	ATION AND AIR-CONDITIONI	NG UNIT (60 hours) (IR)		
CONTENTS: 1. Measuring air circulation and velocity 1.1 Velometer 1.2 anemometer 2. Temperature testing 2.1 Thermometer 3. Current and voltage measurement 3.1 Clamp ammeter			LO4. CONDUCT PERFORMANCE TEST ON THE INSTALLATION OF WINDOW TYPE AIRCON 4.1 Check voltage and current according to unit power requirements. 4.2 Check air temperature and velocity based on unit specifications. 4.3 Inspect sounds and vibration based on unit specifications 4.4 Prepare Installation, testing and commissioning (ITC) report	TLE_IARA10IR-Ia-IIj-4
SERVICE AND MAINTAIN WIN	DOW- TYPE AIR-CONDITIONIN	NG / DOMESTIC REFRIGERATION	ON UNITS (60 hours) (SR)	
CONTENTS: 1. Types and classification of air filter used in WAC 2. Effects of restricted air flow in WAC 3. Cleaning and replacing air filters	The learner demonstrates an understanding of the principles in the servicing and maintainance of window type air-conditioning units.	The learner independently performs the servicing and maintainance of window type air-conditions based on the service manual.	LO1. CLEAN AND REPLACE AIR FILTER 1.1 Remove air filter from the unit 1.2 Check air filter for damage or replacement 1.3 Clean air filter 1.4 Replace defective air filter in accordance with manufacturer's specification	TLE_IARA10SR-IIIa-j- 1
CONTENTS: 4. Assembling and disassembling evaporator/condenser in WAC 5. Cleaning procedure using high pressure washer 6. Straightening of fins			LO2. SERVICE EVAPORATOR AND CONDENSER 2.1 Select tools in dismantling the evaporator / condensing unit as per standard operating procedures (SOPs)	TLE_IARA10SR-IVa-j- 2

INDUSTRIAL ARTS - RAC SERVICING (DOMRAC)						
CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE		
 Types and application of cleaning agent Effects of heavily dented, corroded coil fins in unit operation Preventive and corrective maintenance of WAC Safety practices Montreal protocol Ozone depletion substances (ODS) 			 2.2 Use high pressure washer in cleaning evaporator/ condensing coil based on standard operating procedure 2.3 Repair defective evaporator/condenser coil fins 2.4 Replace defective evaporator/condenser coil fins in accordance with manufacturer's specification 2.5 Apply cleaning agent or non-corrosive chemical in cleaning and maintaining evaporator/ condensing coil, fins and other body accessories as per standard operating procedures (SOPs) 			

Code Book Legend

Sample: TLE_IARA10SR-IIIa-j-1

LEGEN	D	SAMPLE	
First Entry	Learning Area and Strand/ Subject or Specialization	Technology and Livelihood Education_Industrial Arts RAC Servicing	TLE_IA RA 10
That End y	Grade Level	Grade 9	
Uppercase Letter/s	Domain/Content/ Component/ Topic	Service and Maintain Window-Type Air- Conditioning/ Domestic Refrigeration Units	SR
			-
Roman Numeral *Zero if no specific quarter	Quarter	Third Quarter	ш
*Put a hyphen (-) in between letters to indicate more than a specific week	Week	Week One to Ten	a-j
Arabic Number	Competency	Clean and Replace Air Filter	1

DOMAIN/ COMPONENT	CODE
Personal Entrepreneurial Skills	PECS
Environment and Marketing	EM
Use and Maintain Tools and Equipment	UT
Perform Estimation and Basic Calculation	MC
Interpret Technical Drawings and Plans	ID
Maintain Tools and Equipment	MT
Perform Housekeeping and Safety Practices for RAC Servicing	OS
Install Domestic Refrigeration and Air- Conditioning Units	IR
Service and Maintain Window-Type Air- Conditioning/ Domestic Refrigeration Units	SR