K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL TECHNOLOGY AND LIVELIHOOD EDUCATION AND SENIOR HIGH SCHOOL - TECHNICAL-VOCATIONAL LIVELIHOOD TRACK
INDUSTRIAL ARTS - RAC SERVICING (PACU/CRE) NC III
(640 hours)

These are the specializations and their pre-requisites. These lists should be used as reference for curriculum maps.

AGRI-FISHERY ARTS

	Specialization	Number of Hours	Pre-requisite
1.	Agricultural Crops Production (NC I)	320 hours	
2.	Agricultural Crops Production (NC II) *updated based on TESDA Training Regulations published December 28, 2013*	640 hours	
3.	Agricultural Crops Production (NC III)	640 hours	Agricultural Crops Production (NC II)
4.	Animal Health Care Management (NC III)	320 hours	Animal Production (Poultry-Chicken) (NC II) or Animal Production (Ruminants) (NC II) or Animal Production (Swine) (NC II)
5.	Animal Production (Poultry-Chicken) (NC II) *updated based on TESDA Training Regulations published December 28, 2013*	320 hours	
6.	Animal Production (Large Ruminants) (NC II) *updated based on TESDA Training Regulations published December 28, 2013*	320 hours	
7.	Animal Production (Swine) (NC II) *updated based on TESDA Training Regulations published December 28, 2013*	320 hours	
8.	Aquaculture (NC II)	640 hours	
9.	Artificial Insemination (Large Ruminants) (NC II)	160 hours	Animal Production (Large Ruminants) (NC II)
10.	Artificial Insemination (Swine) (NC II)	160 hours	Animal Production (Swine) (NC II)
11.	Fish Capture (NC II)	640 hours	
12.	Fishing Gear Repair and Maintenance (NC III)	320 hours	
13.	Fish-Products Packaging (NC II)	320 hours	
14.	Fish Wharf Operation (NC I)	160 hours	
15.	Food Processing (NC II)	640 hours	
16.	Horticulture (NC III)	640 hours	Agricultural Crops Production (NC II)
17.	Landscape Installation and Maintenance (NC II)	320 hours	
18.	Organic Agriculture (NC II)	320 hours	
19.	Pest Management (NC II)	320 hours	
20.	Rice Machinery Operations (NC II)	320 hours	
21.	Rubber Processing (NC II)	320 hours	
22.	Rubber Production (NC II)	320 hours	
23.	Slaughtering Operations (Hog/Swine/Pig) (NC II)	160 hours	

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL TECHNOLOGY AND LIVELIHOOD EDUCATION AND SENIOR HIGH SCHOOL - TECHNICAL-VOCATIONAL LIVELIHOOD TRACK
INDUSTRIAL ARTS - RAC SERVICING (PACU/CRE) NC III
(640 hours)

HOME ECONOMICS

	Specialization	Number of Hours	Pre-requisite
1.	Attractions and Theme Parks Operations with Ecotourism (NC II)	160 hours	
2.	Barbering (NC II)	320 hours	
3.	Bartending (NC II)	320 hours	
4.	Beauty/Nail Care (NC II)	160 hours	
5.	Bread and Pastry Production (NC II)	160 hours	
6.	Caregiving (NC II)	640 hours	
7.	Commercial Cooking (NC III)	320 hours	Cookery (NC II)
8.	Cookery (NC II)	320 hours	
9.	Dressmaking (NC II)	320 hours	
10.	Events Management Services (NC III)	320 hours	
11.	Fashion Design (Apparel) (NC III)	640 hours	Dressmaking (NC II) or Tailoring (NC II)
12.	Food and Beverage Services (NC II) *updated based on TESDA Training Regulations published December 28, 2013*	160 hours	
13.	Front Office Services (NC II)	160 hours	
14.	Hairdressing (NC II)	320 hours	
15.	Hairdressing (NC III)	640 hours	Hairdressing (NC II)
16.	Handicraft (Basketry, Macrame) (Non-NC)	160 hours	
17.	Handicraft (Fashion Accessories, Paper Craft) (Non-NC)	160 hours	
18.	Handicraft (Needlecraft) (Non-NC)	160 hours	
19.	Handicraft (Woodcraft, Leathercraft) (Non-NC)	160 hours	
20.	Housekeeping (NC II) *updated based on TESDA Training Regulations published December 28, 2013*	160 hours	
21.	Local Guiding Services (NC II)	160 hours	
22.	Tailoring (NC II)	320 hours	
23.	Tourism Promotion Services (NC II)	160 hours	
24.	Travel Services (NC II)	160 hours	
25.	Wellness Massage (NC II)	160 hours	

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL TECHNOLOGY AND LIVELIHOOD EDUCATION AND SENIOR HIGH SCHOOL - TECHNICAL-VOCATIONAL LIVELIHOOD TRACK
INDUSTRIAL ARTS - RAC SERVICING (PACU/CRE) NC III
(640 hours)

INDUSTRIAL ARTS

	Specialization	Number of Hours	Pre-requisite
1.	Automotive Servicing (NC I) *updated based on TESDA Training Regulations published December 28, 2013*	640 hours	
2.	Automotive Servicing (NC II)	640 hours	Automotive Servicing (NC I)
3.	Carpentry (NC II)	640 hours	
4.	Carpentry (NC III)	320 hours	Carpentry (NC II)
5.	Construction Painting (NC II)	160 hours	
6.	Domestic Refrigeration and Air-conditioning (DOMRAC) Servicing (NC II)	640 hours	
7.	Driving (NC II)	160 hours	
8.	Electrical Installation and Maintenance (NC II)	640 hours	
9.	Electric Power Distribution Line Construction (NC II)	320 hours	Electrical Installation and Maintenance (NC II)
10.	Electronic Products Assembly and Servicing (NC II) *updated based on TESDA Training Regulations published December 28, 2013*	640 hours	
11.	Furniture Making (Finishing) (NC II)	640 hours	
12.	Instrumentation and Control Servicing (NC II)	320 hours	Electronic Products Assembly and Servicing (EPAS) (NC II)
13.	Gas Metal Arc Welding (GMAW) (NC II)	320 hours	Shielded Metal Arc Welding (SMAW) (NC II)
14.	Gas Tungsten Arc Welding (GTAW) (NC II)	320 hours	Shielded Metal Arc Welding (GMAW) (NC II)
15.	Machining (NC I)	640 hours	
16.	Machining (NC II)	640 hours	Machining (NC I)
17.	Masonry (NC II)	320 hours	
18.	Mechatronics Servicing (NC II)	320 hours	Electronic Products Assembly and Servicing (EPAS) (NC II)
19.	Motorcycle/Small Engine Servicing (NC II)	320 hours	
20.	Plumbing (NC I)	320 hours	
21.	Plumbing (NC II)	320 hours	Plumbing (NC I)
22.	Refrigeration and Air-Conditioning (Packaged Air-Conditioning Unit [PACU]/Commercial Refrigeration Equipment [CRE]) Servicing (NC III)	640 hours	Domestic Refrigeration and Air-conditioning (DOMRAC) Servicing (NC II)
23.	Shielded Metal Arc Welding (NC I)	320 hours	
24.	Shielded Metal Arc Welding (NC II)	320 hours	Shielded Metal Arc Welding (NC I)
25.	Tile Setting (NC II)	320 hours	
26.	Transmission Line Installation and Maintenance (NC II)	640 hours	Electrical Installation and Maintenance (NC II)

INFORMATION, COMMUNICATIONS AND TECHNOLOGY (ICT)

	Specialization	Number of Hours	Pre-requisite
1.	Animation (NC II)	320 hours	
2.	Broadband Installation (Fixed Wireless Systems) (NC II)	160 hours	Computer Systems Servicing (NC II)
3.	Computer Programming (.Net Technology) (NC III) *updated based on TESDA Training Regulations published December 28, 2013*	320 hours	
4.	Computer Programming (Java) (NC III) *updated based on TESDA Training Regulations published December 28, 2013*	320 hours	
5.	Computer Programming (Oracle Database) (NC III) *updated based on TESDA Training Regulations published December 28, 2013*	320 hours	
6.	Computer Systems Servicing (NC II) *updated based on TESDA Training Regulations published December 28, 2007*	640 hours	
7.	Contact Center Services (NC II)	320 hours	
8.	Illustration (NC II)	320 hours	
9.	Medical Transcription (NC II)	320 hours	
10.	Technical Drafting (NC II)	320 hours	
11.	Telecom OSP and Subscriber Line Installation (Copper Cable/POTS and DSL) (NC II)	320 hours	Computer Systems Servicing (NC II)
12.	Telecom OSP Installation (Fiber Optic Cable) (NC II)	160 hours	Computer Systems Servicing (NC II)

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL TECHNOLOGY AND LIVELIHOOD EDUCATION AND SENIOR HIGH SCHOOL - TECHNICAL-VOCATIONAL LIVELIHOOD TRACK
INDUSTRIAL ARTS - RAC SERVICING (PACU/CRE) NC III
(640 hours)

Prerequisite: DOMRAC Servicing NC II

Course Description:

This qualification covers the basic competencies required for a third level qualification, such as 1) leading in the dissemination and discussion of ideas, information and issues in the workplace, 2) leading small teams, 3) developing and practicing negotiation skills, 4) solving problems related to work activities, 5) using mathematical concepts and techniques and 5) using other relevant technologies. It also covers the common competencies such as, 1) preparing, materials and tools, 2) interpreting technical drawing and plans, 3) observing procedures, specifications, and manuals of instruction, 4) performing mensuration and calculation, 5) performing basic bench work, 6) performing basic electrical works, 7) maintaining tools and equipment, 8) performing housekeeping and safety practices for refrigeration servicing, and 9) documenting work accomplished. This unit also covers the core knowledge, skills and attitudes in conducting survey site for installation of equipment, piping, air distribution and electrical controls and wiring for package-type air-conditioning/commercial refrigeration units.

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
Introduction 1. Advance principles of electricity and mechanical aspects of refrigeration unit 2. Relevance of the course 3. 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.	1. Explain basic principles of electrical and mechanical aspects of domestic refrigeration unit. 2. Discuss the relevance of the course. 3. Explore career opportunities in RAC servicing.	
PERSONAL ENTREPRENEURIAL COMPETENCIES (PECS)				
1. 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 2. Analysis of PECS in relation to a practitioner 3. Aligning, strengthening and developing one's 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, and traits. 1.2 Assess practitioner's PECS: characteristics, attributes, lifestyle, skills, and traits. 1.3 Compare one's PECS with that of a practitioner /entrepreneur. 1.4 Align one's PECS with that of a practitioner/entrepreneur.	**TLE_ PECS9-12-00-1**

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL TECHNOLOGY AND LIVELIHOOD EDUCATION AND SENIOR HIGH SCHOOL - TECHNICAL-VOCATIONAL LIVELIHOOD TRACK
INDUSTRIAL ARTS - RAC SERVICING (PACU/CRE) NC III
(640 hours)

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
ENVIRONMENT AND MARKET (EM)				
Market (Town) 1. Key concepts of market 2. Players in the market (competitors) 3. Products and services available in the market	The learner demonstrates an understanding of the concepts on *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_ EM9-12-00-1**
Market (Customer) 1. Key concepts in identifying and understanding the consumer 2. Consumer analysis tHourough: 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 tHourough consumer analysis. 2.3 Conduct consumer/market analysis.	**TLE_ EM9-12-00-2**
1. Generating Business Idea 1.1 Key concepts in Generating Business Ideas 1.2 Knowledge, Skills, Passions and Interests 1.3 New applications 1.4 Irritants 1.5 Striking ideas (new concept) 1.6 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_ EM9-12-00-3**

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL TECHNOLOGY AND LIVELIHOOD EDUCATION AND SENIOR HIGH SCHOOL - TECHNICAL-VOCATIONAL LIVELIHOOD TRACK
INDUSTRIAL ARTS - RAC SERVICING (PACU/CRE) NC III
(640 hours)

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
BASIC COMPETENCIES				
LESSON 1: LEADING WORKPLACE COMMUNICATION (LWC)				
• Methods of communication • Sources of communication • Communication skills • Questioning techniques	The learner demonstrates understanding of concepts, theories and principles in leading workplace communication.	The learner independently leads workplace communication.	**LO 1. Communicate information about workplace processes.** 1.1 Select appropriate communication method. 1.2 Communicates accordingly with multiple operations involving several topic areas. 1.3 Use questions to gain extra information. 1.4 Identify correct sources of information. 1.5 Select and organize information correctly. 1.6 Undertake verbal and written reporting when required. 1.7 Maintain communication skills in all situations.	**TLE_IARAC9-12LWC-Ia-1**
• Methods/techniques of discussion • How to lead discussion • How to solicit responses			**LO 2. Lead workplace discussions.** 2.1 Sought responses to workplace issues. 2.2 Provide response to workplace issues immediately. 2.3 Make constructive contributions to workplace discussions on such issues as production, quality and safety. 2.4 Communicate goals/objectives and action plan undertaken in the workplace.	**TLE_IARAC9-12LWC-Ia-2**
• Identify problems and issues in the workplace • Organizing information on problems and issues • Communication barriers			**LO 3. Identify and communicate issues arising in the workplace.** 3.1 Identify issues and problems as they arise. 3.2 Organize coherently information regarding problems and issues to ensure clear and effective communication. 3.3 Initiate dialogue with appropriate personnel. 3.4 Raise communication problems and issues as they arise.	**TLE_IARAC9-12LWC-Ia-3**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
LESSON 2: LEADING SMALL TEAM (LST)				
• Communication skills required for leading small team • Skills/techniques in team building • Negotiating skills • Up-to-date dissemination of instruction and requirements to members • Art of listening and treating individual team members concern	The learner demonstrates understanding of concepts, theories and principles in leading small team.	The learner independently leads small team.	**LO 1. Provide team leadership.** 1.1 Identify and present work requirements to members. 1.2 Communicate reasons for instructions and requirements to team members. 1.3 Recognize, discuss, deal with team members' queries and concerns.	**TLE_IARAC9-12LST-Ia-4**
• Duties and responsibilities of each team members • Identifying individual skills, knowledge and attitude • Rostering staff			**LO 2. Assign responsibilities among members.** 2.1 Allocate duties and responsibilities with respect to the skills, knowledge and attitudes of every team member. 2.2 Allocate duties with regards to individual preference, domestic and personal considerations.	**TLE_IARAC9-12LST-Ib-5**
• Company policies and procedures • Defining performance expectations criteria • How performance expectation are set			**LO 3. Set performance expectation for team members.** 3.1 Establish performance expectations based on clients needs and according to assignment requirements. 3.2 Base performance expectations on individual team member's duties and area of responsibility. 3.3 Discuss and disseminate performance expectations to individual team members.	**TLE_IARAC9-12LST-Ib-6**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE

• Methods of monitoring performance
  - Formal process
  - Informal process
• Informal/formal counseling skills
• Monitoring team operations
• Relevant legal requirements
			LO 4. Supervise team performance.
			4.1 Monitor team members performance against defined performance criteria and/or assignment instructions and corrective action taken if required.
			4.2 Provide feedback with positive support and advice on strategies to overcome any deficiencies to team members.
			4.3 Refer performance issues which cannot be rectified or addressed within the team to appropriate personnel according to employer policy.
			4.4 Keep informed of any changes in the priority allocated to assignment or tasks which might impact on client/customer needs and satisfaction to team members.
			4.5 Monitor team operations to ensure that employer/client needs and requirements are met.
			4.6 Provide follow-up communications on all issues affecting the team.
			4.7 Complete all relevant documentation in accordance with company procedures.
				TLE_IARAC9-12LST-Ib-7

LESSON 3: DEVELOPING AND PRACTICING NEGOTIATION SKILLS (DPN)				
• Codes of practice and guidelines for the organization • Background information on other parties on negotiations • Strategies to manage process • Differences between content and process	The learner demonstrates understanding of concepts, theories and principles in developing and practicing negotiation skills.	The learner independently develops and practice negotiation skills.	**LO 1. Plan negotiations.** 1.1 Identify and include information on preparing for negotiation in the plan. 1.2 Identify and include information on active listening in the plan. 1.3 Identify and include information on different questioning techniques in the plan. 1.4 Check information to ensure it is correct and appropriate.	**TLE_IARAC9-12DPN-Ib-8**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Organizations' policy and procedures for negotiations • Interpersonal skills to develop rapport with other parties • Steps in negotiating process • How to deal with unexpected questions and attitudes during negotiations • Decision making and conflict resolution strategies procedures • Procedure in documenting negotiations • Managing information • Filing documents			**LO 2. Participate in negotiations.** 2.1 Agree on set criteria for successful outcome by all parties. 2.2 Consider desired outcome of all parties. 2.3 Use appropriate language thorough out the negotiations. 2.4 Use a variety of questioning techniques. 2.5 Document issues and processes agree upon by all parties. 2.6 Discuss and assess possible solutions and viability. 2.7 Confirm and record areas for agreement. 2.8 Agree on follow-up action by all parties.	**TLE_IARAC9-12DPN-Ic-9**
LESSON 4: SOLVING PROBLEMS RELATED TO WORK ACTIVITIES (PRW)				
• Normal operating parameters and product quality • Application of analytical techniques - Brainstorming - Intuitions/logic - Cause and effect diagrams - SWOT analysis • Identifying the nature of problems - Non-routine process and quality problems - Teamwork and work allocation problem - Safety and emergency - situations and incidents	The learner demonstrates understanding of concepts, theories and principles in solving problems related to work activities.	The learner independently solves problems related to work activities.	**LO 1. Identify the problem.** 1.1 Identify variances from normal operating parameters and product quality. 1.2 Define extent, cause and nature of the problem through observation, investigation and analytical techniques. 1.3 State and specify problems clearly.	**TLE_IARAC9-12PRW-Ic-10**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Identification of fundamental causes of the problem			**LO 2. Determine fundamental causes of the problem.** 2.1 Identify possible causes based on experience and the use of problem solving tools/analytical techniques. 2.2 Develop possible cause statements based on findings. 2.3 Identify fundamental causes per results of investigation conducted.	**TLE_IARAC9-12PRW-Ic-11**
• Possible options for the resolution of problems • Priority requirements • Resource requirements • Coordination and feedback requirements • Safety requirements • Environmental requirements			**LO 3. Determine corrective action.** 3.1 Consider all possible options for resolution of the problem. 3.2 Consider the strengths and weaknesses of possible options. 3.3 Determine corrective actions to resolve the problem and possible future causes. 3.4 Develop action plan, identify measurable objectives, resource needs and timelines in accordance with safety and operating procedures.	**TLE_IARAC9-12PRW-Ic-12**
• Case studies on solving problems in the workplace • Devising the best solution • Evaluating the solutions • Implementation of a develop plan to rectify the problem			**LO 4. Provide recommendations to manager.** 4.1 Prepare report on recommendations. 4.2 Present recommendations to appropriate personnel. 4.3 Follow-up recommendations, if required.	**TLE_IARAC9-12PRW-Id-13**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
LESSON 5: USING MATHEMATICAL CONCEPTS AND TECHNIQUES (MCT)				
• Steps in solving a problem • Four fundamental operations • Measurement • Use/conversion of units of measurements	The learner demonstrates understanding of concepts, theories and principles in using mathematical concepts and techniques.	The learner independently uses mathematical concepts and techniques.	**LO 1. Identify mathematical tools and techniques to solve problem.** 1.1 Identify problem areas based on a given condition. 1.2 Select mathematical techniques based on the given problem.	**TLE_IARAC9-12MCT-Id-14**
• Basic measuring tools/devices • Mathematical computations • Use standard formulas			**LO 2. Apply mathematical procedure/solution.** 2.1 Apply mathematical techniques based on the problem identified. 2.2 Perform mathematical computations to the level of accuracy required for the problem. 2.3 Determine and verify results of mathematical computations based on job requirements.	**TLE_IARAC9-12MCT-Id-15**
• Review in the use of mathematical techniques • Reporting errors to immediate superior for proper action			**LO 3. Analyze results.** 3.1 Review result of application based on expected and required specifications and outcome. 3.2 Apply appropriate action in case of error.	**TTLE_IARAC9-12MCT-Id-16**
LESSON 6: USING RELEVANT TECHNOLOGIES (URT)				
• Different technologies based on job requirements: - Office technology - Industrial technology - System technology - Information technology - Training technology	The learner demonstrates understanding of concepts, theories and principles in using relevant technologies.	The learner independently uses relevant technologies based on job requirements.	**LO 1. Study/select appropriate technology.** 1.1 Determine use of different technologies based on job requirements. 1.2 Select appropriate technology as per work specification.	**TLE_IARAC9-12URT-Ie-17**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Management concepts • Software and hardware application skills • Basic troubleshooting skills			**LO 2. Apply relevant technology.** 2.1 Use effectively relevant technology in carrying out function. 2.2 Use applicable software and hardware as per task requirement. 2.3 Observe and practice management concepts as per established industry practices.	**TLE_IARAC9-12URT-Ie-18**
• Written guidelines for the usage of office technology/equipment • Manufacturer's operating guidelines/instructions • Occupational safety and health standards (OSHS) • Preventive maintenance schedule • Verbal advise/instructions from the co-worker			**LO 3. Maintain/enhance relevant technology.** 3.1 Apply maintenance of technology in accordance with the industry standard operating procedures; manufacturer's operating guidelines, and occupational health and safety procedures to ensure its operative ability. 3.2 Maintain updates of technology tHourough continuing education or training in accordance with job requirement. 3.3 Report immediately technology failure/defect to the concerned/responsible person or section for appropriate action.	**TLE_IARAC9-12URT-Ie-19**
COMMON COMPETENCIES				
LESSON 7: PREPARING MATERIALS AND TOOLS (PMT)				
• Classification of construction materials, tools and equipment • Quantification /estimates of tools and materials • Specification of construction materials • SOP in requesting tools and materials • Table of elements • Comparing and contrasting of objects • Making of reports • Storing/stockpiling of materials	The learner demonstrates understanding of concepts, theories and principles in preparing materials and tools	The learner independently prepares materials and tools	**LO 1. Identify materials.** 1.1 List materials as per job requirements 1.2 Quantity and description of materials conformed to the job requirements 1.3 Identify tools and accessories according to job requirements	**TLE_IARAC9-12PMT-If-20**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Manuals reading and plan specifications • Reading and comprehension of interpreting manuals. • Written communication skills • Signs and symbols - electrical - mechanical			**LO 2. Requisition materials.** 2.1 Request material and tools needed according to prepared list. 2.2 Request is done as per company standard operating procedures. 2.3 Provide substitute materials and tools without sacrificing cost and quality of the work.	**TLE_IARAC9-12PMT-If-21**
• Reading and comprehension skills required to identify and interpret construction manuals and specifications • Accessing information and data • Work schedule • Steps of work?			**LO 3. Receive and inspect materials.** 3.1 Inspect issued materials and tools as per quantity and specification. 3.2 Check tools, accessories and materials for damages according to enterprise procedures. 3.3 Set aside materials and tools to appropriate location nearest to the workplace.	**TLE_IARAC9-12PMT-Ig-22**
LESSON 8: INTERPRETING TECHNICAL DRAWINGS AND PLANS (TDP)				
• Technical plans and symbols • Data and work specifications • Drawing materials and instruments	The learner demonstrates understanding of concepts, theories and principles in interpreting technical drawings and plan	The learner independently interprets technical drawings and plans	**LO 1. Analyze signs, symbols and data.** 1.1 Obtain technical plans according to job requirements. 1.2 Identify signs, symbols and data according to job specifications. 1.3 Determine signs symbols and data according to classification or as appropriate in drawing.	**TLE_IARAC9-12TDP-Ig-23**
• Drawing tools and instruments • Dimensions of work plan and specifications • Drawing work plan • Identify components and assemblies needed			**LO 2. Interpret technical drawings and plans.** 2.1 Identify necessary tools, materials and equipment according to plan. 2.2 List supplies and materials according to specifications. 2.3 Recognize components, assemblies or	**TLE_IARAC9-12TDP-Ig-24**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
			objects as require. 2.4 Identify dimensions as appropriate to the plan. 2.5 Match specifications details with existing/available resources in line with job requirements. 2.6 Draw work plan following the specifications.	
• Correct sketching procedure • Freehand drawing procedures • Drawing tools and instruments			**LO 3. Apply freehand sketching** 3.1 Sketch where applicable, correct freehand is produced in accordance with the job requirements.	**TLE_IARAC9-12TDP-Ih-25**
LESSON 9: OBSERVING PROCEDURES, SPECIFICATIONS AND MANUALS OF INSTRUCTION (OSM)				
• Types of manuals used in HVAC/R sector • Identification of symbols used in the manuals • Identification of units of measurements • Units of conversion	The learner demonstrates understanding of concepts, theories and principles in observing procedures, specifications and manuals of instruction	The learner independently observes procedures, specifications and manual of instruction	**LO1. Identify and access specification/ manuals.** 1.1 Identify and access appropriate manuals as per job requirements. 1.2 Check and identify version and date of manual to ensure correct specification and procedure.	**TLE_IARAC9-12OSM-Ih-26**
• Manual reading and plan specifications • Reading and comprehension of interpreting manuals • Written communication skills • Signs and symbols - Electrical - Mechanical			**LO 2. Interpret manuals.** 2.1 Locate relevant sections, chapters of specifications manuals in relations to the work to be conduct. 2.2 Interpret information and procedure in the manual in accordance to industry practices.	**TLE_IARAC9-12OSM-Ih-27**
• Reading and comprehension skills required to identify & interpret construction manuals and specifications • Accessing information and data			**LO 3. Apply information in manual.** 3.1 Interpret manual according to job requirements. 3.2 Identify work steps correctly in accordance with manufacturer's	**TLE_IARAC9-12OSM-Ih-28**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Work schedule • Steps of work			specification. 3.3 Apply manual data according to the given task. 3.4 Interpret all correct sequencing and adjustment in accordance with information contain on the manual or specifications.	
• 5S procedure • Proper storage of manual			**LO 4. Store manuals.** 4.1 Store manual or specification appropriately to ensure prevention of damage, ready access and updating of information when required in accordance with company requirements.	**TLE_IARAC9-12OSM-Ii-29**
LESSON 10: PERFORMING MENSURATION AND CALCULATION (PMC)				
• Linear measurements • Testing measurements • Four fundamental operations • Dimensions • Units of conversion • Ratio and proportion • Trigonometric functions • Algebraic equations	The learner demonstrates understanding of concepts, theories and principles in performing mensuration and calculation	The learner independently performs mensuration and calculation	**LO 1. Select measuring instrument.** 1.1 Identify, classify and interpret object or component to be measure to the appropriate regular geometric shape. 1.2 Select/identify measuring tools as per object to be measure or job requirement. 1.3 Obtain correct specifications from relevant sources. 1.4 Select appropriate measuring instruments according to job requirements. 1.5 Used alternative measuring tools without sacrificing cost and quality of work.	**TLE_IARAC9-12PMC-Ii-30**
• Linear measurements • Four fundamental operations • Dimensions • Units of conversion • Ratio and proportion • Trigonometric functions • Algebraic equations			**LO 2. Carry out measurements and calculations.** 2.1 Obtain accurate measurements and calculations for the job requirements. 2.2 Use alternative measuring tools without sacrificing cost and quality of work. 2.3 Perform calculation needed to complete work tasks using the four basic processes: addition (+), subtraction (-), multiplication	**TLE_IARAC9-12PMC-Ii-j-31**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
			(x) and division (/) including but not limited to: trigonometric functions, algebraic computations. 2.4 Use calculations involving fractions, percentages and mixed numbers to complete workplace tasks. 2.5 Self-check and correct numerical computation for accuracy. 2.6 Read instrument to the limit of accuracy of the tool. 2.7 Identify and convert systems of measurement according to job requirements/ISO. 2.8 Measure workpieces according to job requirements.	
LESSON 11: PERFORMING BASIC BENCHWORK (PBB)				
• Communication skills • Materials, tools and equipment, uses, and specifications	The learner demonstrates understanding of concepts, theories and principles in performing basic benchwork.	The learner independently performs basic benchwork.	**LO 1. Prepare materials, tools and equipment.** 1.1 Interpret work plan to determine job requirements. 1.2 Identify and prepare materials, tools and equipment according to job requirement. 1.3 Check materials according to the require specifications.	**TLE_IARAC9-12PBB-Ij-32**
• Measuring tools, functions and uses • Communication skills • Trade mathematics • Mensuration • Calculation • Conversion • Plan specifications			**LO 2. Lay-out and mark dimensions/ features on workplace** 2.1 Select metallic and non-metallic materials according to the requirements specified in the blueprint. 2.2 Lay-out/mark dimensions/features according to job specifications/blueprint and within the require tolerance. 2.3 Check dimensions against the actual work plan.	**TLE_IARAC9-12PBB-Ij-IIa-33**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Tools and equipment: use and specifications • Grinding, cutting, drilling, filing techniques • Basic welding principles and application • Applied occupational health and safety (OH & S)			**LO 3. Perform required benchworks.** 3.1 Follow work instruction to ensure safety. 3.2 Perform bechworks according to job requirements. 3.3 Clamp workpieces in workholding device to avoid damage and accidents. 3.4 Chip or file work pieces cut according to require measurements, tolerance specify in the blueprint and free from burrs and sharp edges. 3.5 Perform drilling according to recommended sequence and specifications. 3.6 Observe proper usage of materials, tools and equipment. 3.7 Apply appropriate PPE and safety procedures. 3.8 Clean and clear worksite debris and left in safe in accordance with OHS regulations.	**TLE_IARAC9-12PBB-IIa-34**
LESSON 12: PERFORMING BASIC ELECTRICAL WORKS (PBE)				
• Electrical plans and symbols • Work plan • Electrical tools, instruments and materials • Calibration and checking electrical test instruments	The learner demonstrates understanding of concepts, theories and principles in performs basic electrical works.	The learner independently performs basic electrical works.	**LO 1. Prepare electrical tools and test instrument.** 1.1 Interpret work plan to determine job requirement. 1.2 Identify and prepare electrical tools and instruments according to job requirements. 1.3 Check electrical tools and instruments for conditions and calibrate as require.	**TLE_IARAC9-12PBE-IIa-35**
• Electrical test instruments • Checking power supply and electrical components • Maintenance log sheet • Maintenance activity			**LO 2. Test power supply and electrical components.** 2.1 Test instrument in accordance with PEC. 2.2 Check power supply and electrical components in accordance with	**TLE_IARAC9-12PBE-IIb-36**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Applied PPE and work safety procedures			manufacturer's specifications/PEC. 2.3 Identify and record defects of power supply and electrical components. 2.4 Observe safe working habits.	
• Safe working procedures according to manual • PEC • Electrical connections defects • Replacement and testing defective electrical components • 5S			**LO 3. Perform basic electrical repair** 3.1 Follow work instructions to ensure safety work. 3.2 Tightened loose connections in accordance with PEC. 3.3 Replace and test defective electrical components in accordance with PEC. 3.4 Clean work place in a safe state in line with OHSA regulations.	**TLE_IARAC9-12PBE-IIb-37**
LESSON 13: MAINTAINING TOOLS AND EQUIPMENT (MTE)				
• Proper use of tools and equipment • Testing procedures • Communication skills • Fundamentals of refrigeration and air conditioning (RAC) • Parts and functions of HVAC/R equipment • Applied occupational health and safety (OH & S) • Housekeeping	The learner demonstrates understanding of concepts, theories and principles in maintaining tools and equipment	The learner independently maintains tools and equipment	**LO 1. Check condition tools and equipment** 1.1 Identify materials, tools and equipment according to classification and job requirements. 1.2 Segregate and label non-functional tools and equipment according to classification. 1.3 Observe safety tools and equipment in accordance with manufacturer's instructions. 1.4 Check condition of PPE in accordance with manufacturer's instructions.	**TLE_IARAC9-12MTE-IIb-38**
• Types of lubricants • Housekeeping • Inventory guidelines and procedures • HVAC/R equipment, tools and instrument types and specifications • Lubrication procedures			**LO 2. Perform basic preventive maintenance.** 2.1 Identify appropriate lubricants according to types of equipment. 2.2 Lubricate tools and equipment according to preventive maintenance schedule or manufacturer's specifications. 2.3 Check and calibrate measuring	**TLE_IARAC9-12MTE-IIb-39**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• HVAC/R equipment operating procedures			instruments accordance with manufacturer's instruction. 2.4 Clean and lubricate tools according to standard procedures. 2.5 Inspect and replace defective instruments, equipment and accessories according to manufacturer's specifications. 2.6 Repair and replace tools every after use. 2.7 Clean workplace in a safe state in line with OHSA regulations.	
• Inventory form • Inventory guidelines and procedures • Proper and safety storing of tools			**LO 3. Store tools and equipment** 3.1 Conduct and record inventory of tools, instruments and equipment as per company practices. 3.2 Store tools and equipment safely in appropriate locations in accordance with manufacturer's specifications or company procedures.	**TLE_IARAC9-12MTE-IIc-40**
LESSON 14: PERFORMING HOUSEKEEPING AND SAFETY PRACTICES FOR REFRIGERATION SERVICING (PHSR)				
• Classification of tools, equipment and materials • Consideration in the selection of appropriate areas for storing materials, tools and equipment • Sorting procedures and considerations			**LO 1. Sort materials, tools and equipment.** 1.1 Classify materials, tools and equipment according to its kind. 1.2 Designate appropriate areas for materials, tools and equipment.	**TLE_IARAC9-12PHSR-IIc-41**
• Cleaning materials, types and applications. • Procedures in cleaning workplace area, tools and equipment. • Consideration of a safe workplace area, tools and equipment			**LO 2. Clean workplace area, materials, tools and equipment** 2.1 Identify and use clean materials as per procedure. 2.2 Clean workplace areas, materials, tools and equipment per company practices. 2.3 Safe workplace state in accordance with safety regulations/company practices.	**TLE_IARAC9-12PHSR-IIc-42**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Procedures in dispensing and retrieval of materials; tools, and equipment • Things to be considered in returning the borrowed tools and equipment.			**LO 3. Systematize dispensing and retrieval of materials tools and equipment** 3.1 Implement systems for request, borrow and return of materials, tools and equipment in place. 3.2 Completely fill-up, use forms and file. 3.3 Return borrowed tools and equipment to designated area. 3.4 Request consumable materials in exact quantity.	**TLE_IARAC9-12PHSR-IId-43**
• Composition of safety committee • Policies and procedures in controlling risk • Safety signs and first aid • Safety signs and hazards warning preparation • Equipment and safety devices • Safe handling technique in using equipment and safe devices.			**LO 4. Identify and minimize/eliminate hazards** 4.1 Recognize and report hazards in the work area to designate personnel and appropriate control actions. 4.2 Establish and follow accurate workplace policies and procedures for controlling risks 4.3 Follow workplace policies and procedures for dealing emergencies whenever necessary within the scope of responsibilities and competencies. 4.4 Display and observed safety signs and hazard warning at all times in line with workplace health and safety regulations. 4.5 Use/handle equipment and safety devices/PPE according to company manufacturer's procedures and guidelines. 4.6 Keep work areas clean, free from obstacles and emergency exits known are kept clear at all times. 4.7 Employ safe manual techniques and safe equipment operation techniques are employed at all times.	**TLE_IARAC9-12PHSR-IId-44**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Types of accidents • Procedures in applying first aid /treatment • First aid supplies • Steps in responding to and recording accidents			**LO5. Respond and record accidents** 5.1 Identify workplace accidents. 5.2 Follow/carry out correct workplace emergency first-aid procedures/treatment in accordance with standards/regulations and enterprise procedures/policies. 5.3 Coordinate medical assistance/rescue with concerned personnel in line with organizational policies. 5.4 Maintain accident/incident records in accordance with standard operating procedures.	**TLE_IARAC9-12PHSR-IId-45**
• Basic security procedures • Security signs and symbols			**LO 6. Follow basic security.** 6.1 Follow security policies/procedures according to enterprise practices and appropriate legislation. 6.2 Record/report security related events on the relevant forms. 6.3 Advise staff of enterprise security procedures and correct methods of implementation.	**TLE_IARAC9-12PHSR-IIe-46**
LESSON 15: DOCUMENTING WORK ACCOMPLISHED (DWA)				
• Selecting and interpreting forms • Interpreting work accomplished Data gathering techniques	The learner demonstrates understanding of concepts, theories and principles in documenting work accomplished	The learner independently documents work accomplished	**LO 1. Identify forms and data** 1.1 Select forms base on the reports to be prepare. 1.2 Collect data base on the reports to be prepare.	**TLE_IARAC9-12DWA-IIe-47**
• Details of work completion • Kinds of reports • Preparation of reports			**LO 2. Prepare reports.** 2.1 Complete forms use standard form as per company procedures. 2.2 Complete reports provide details of work, further action to take and other details as per company procedures.	**TLE_IARAC9-12DWA-IIe-48**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
			2.3 Complete and submit reports within specified time to the concerned personnel/supervisor.	
CORE COMPETENCIES				
LESSON 16: INSTALLING PACKAGE TYPE AIR-CONDITIONING UNIT (IPA)				
• Technical plans/drawings • Installation requirements • Survey report • Linear measurements • Unit conversion • Blue print reading	The learner demonstrates an understanding of the basic concepts and underlying theories in installing package type air-conditioning unit. (PACU)	The learner independently performs installation of PACU unit based on industry standards.	**LO 1. Survey site for installation.** 1.1 Interpret work instructions/technical plans/drawings as per job requirements. 1.2 Verify installation requirements in line with site conditions. 1.3 Prepare alteration/comments as per survey conducted. 1.4 Prepare result of survey in line with enterprise procedures.	**TLE_IARAC9-12IPA-IIf-j-49**
• Basic refrigeration cycle • Copper tubing processes and its operation • Types of pipes and fittings • Types of copper tubing and fittings • Types of brackets and support • Installation procedures in piping • RAC code of practice • Safety practices • PACU/CRE tools, materials and functions • 5S (good housekeeping practices) • Insulation • Hangers, clamps and brackets			**LO 2. Install PACU piping systems.** 2.1 Prepare piping materials in consistency with the approved designs and specifications. 2.2 Mount brackets and supports in accordance with site conditions. 2.3 Install, clean and test piping materials in accordance with manufacturer's specifications, recommendations and RAC Code of Practice. 2.4 Use and install correct insulation and sealing/adhesive materials in accordance with manufacturer's specifications.	**TLE_IARAC9-12IPA-IIIa-j-50**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Electrical diagrams • Electrical components and accessories function and specification • Process of installing electrical components of PACU • Installation procedures for electrical PACU system • Procedures in electrical testing • Appropriate PPE • Safety practices • PACU tools, materials, instruments • 5 s (good housekeeping practices) • Electrical conduits • Controls and protective devices • Electrical controls, wires/cables • Power supply			**LO 3. Install PACU electrical system.** 3.1 Prepare electrical materials in consistency with job requirements and are checked for damage. 3.2 Select appropriate PPE in line with the job requirements. 3.3 Lay-out and install electrical system in accordance with the approved designs, specifications, working plans, drawings and applicable provisions of the latest edition of PEC. 3.4 Test/energize electrical system in line with applicable provisions of the latest edition of PEC. 3.5 Prepare report on testing/energization of electrical system in line with enterprise procedures.	**TLE_IARAC9-12IPA-IVa-j-51**
• Basic refrigeration cycle • Mechanical components and accessories function and specification • Process of installing mechanical components of PACU • Installation procedures for mechanical components of PACU • Safety practices • PACU tools, materials and functions • 5S (good housekeeping practices) • Package type air con • Split type air con • Filter drier • Moisture indicator • Refrigerant lines • Condensate drain			**LO 4. Install indoor and outdoor unit and accessories.** 4.1 Mount indoor units and air-cooled condensing units (ACCUs) in accordance with site conditions and manufacturer's specifications. 4.2 Install accessories according to manufacturer's specifications. 4.3 Connect refrigerant lines in accordance with manufacturer's specifications. 4.4 Install condensate drain line in accordance with manufacturer's specification. 4.5 Correct faults/problems arising from installation in line with standard operating procedures. 4.6 Undertake pre-start up checks in accordance with manufacturer's specifications and enterprise policies.	**TLE_IARAC9-12IPA-Ia-j-52**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Insulation • Termination • Sequence test • Refrigerant leakage				
LESSON 17: INSTALLING COMMERCIAL REFRIGERATION EQUIPMENT (ICR)				
• Safety practices • Plans specifications • Mensuration • Proper use and care of tools/equipment • Tube processing • Basic arc and gas welding • Basic bench work • Clean air act • Montreal protocol • Code of practice for HVAC technician • Good housekeeping • Piping requirements • Electrical requirements • Equipment requirements	The learner demonstrates an understanding of the basic concepts and underlying theories in installing commercial refrigeration equipment (CRE).	The learner independently performs installation of CRE equipment based on industry standards.	**LO 1. Survey site for installation.** 1.1 Interpret work instructions/technical plans/drawings as per job requirements. 1.2 Verify installation requirements in line with site conditions. 1.3 Prepare alteration/comments as per survey conducted. 1.4 Prepare result of survey in line with enterprise procedures.	**TLE_IARAC9-12ICR-IIa-c-53**
• Basic refrigeration cycle • Copper tubing processes and its operation • Types of pipes and fittings • Types of copper tubing and fittings • Types of brackets and support • Installation procedures in piping • RAC code of practice • Safety practices • PACU / CRE tools, materials and functions • 5S (good housekeeping practices)			**LO 2. Install CRE piping system.** 2.1 Prepare piping materials in consistent with the approved designs and specifications. 2.2 Mount brackets and supports in accordance with site conditions. 2.3 Install, clean and test piping materials in accordance with manufacturer's specifications, recommendations and RAC Code of Practice. 2.4 Use and install correct insulation and sealing/adhesive materials in accordance with manufacturer's specifications.	**TLE_IARAC9-12ICR-IIc-j-54**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Electrical diagrams • Electrical components and accessories function and specification • Process of installing electrical components of CRE • Installation procedures for electrical CRE system • Procedures in electrical testing • Appropriate PPE • Safety practices • PACU tools, materials, instruments • 5 s (good housekeeping practices) • Electrical conduits • Control and protective devices • Electrical control wires/cables			**LO 3. Install CRE electrical systems.** 3.1 Prepare electrical materials in consistent with job requirements and are checked for damage. 3.2 Select appropriate PPE in line with the job requirements. 3.3 Lay-out and install electrical system in accordance with the approved designs, specifications, working plans, drawings and applicable provisions of the latest edition of PEC. 3.4 Test / energize electrical system in line with applicable provisions of the latest edition of PEC. 3.5 Prepare report on testing/energization of electrical system in line with enterprise procedures.	**TLE_IARAC9-12ICR-IIIa-e-55**
• Basic refrigeration cycle • Mechanical components and accessories function and specification • Process of installing mechanical and components CRE • Installation procedures for mechanical components of CRE • Safety practices • CRE tools, materials and functions • 5S (good housekeeping practices) • Walk-in cooler/freezer, evaporator • Reach-in chiller/freezer/evaporator • Non-return valve • Evaporator pressure regulator			**LO 4. Install indoor and outdoor unit and accessories.** 4.1 Mount indoor units and air-cooled condensing units (ACCUs) in accordance with site conditions and manufacturer's specifications. 4.2 Install accessories according to manufacturer's specifications. 4.3 Connect refrigerant lines in accordance with manufacturer's specifications. 4.4 Install condensate drain line in accordance with manufacturer's specification. 4.5 Correct faults/problems arising from installation in line with standard operating procedures. 4.6 Undertake pre-start up checks in accordance with manufacturer's specifications and enterprise policies.	**TLE_IARAC9-12ICR-IIIf-j-56**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
(EPR) • Filter drier • Moisture indicator • Solenoid valve • High pressure control (HPC) • Low pressure control (LPC) • Defrost timer				
LESSON 18: SERVICING AND MAINTAINING PACKAGE TYPE AIR-CONDITIONING UNIT (SMP)				
• Safety practices in RAC works • Tools, equipment and uses • Principles of RAC • Preventive and corrective maintenance • Uses and functions of tools • Interpret work plan instructions • Preventive and corrective maintenance • Types of evaporator condenser and its function	The learner demonstrates an understanding of the basic concepts and underlying theories in servicing and maintaining Package Type Air-conditioning Unit (PACU).	The learner independently performs servicing and maintaining PACU based on industry standards.	**LO 1. Prepare for maintenance activities.** 1.1 Read and interpret work instructions to determine job requirements. 1.2 Consult if available, appropriate manufacturer's manual, otherwise, adopt a standard maintenance procedure. 1.3 Select tools and equipment in accordance with job requirements. 1.4 Observe work safety according to enterprise regulations.	**TLE_IARAC9-12SMP-IVa-b-57**
• Types of refrigerant controls • Refrigerant piping installation • Procedures in leak testing • Operation control/settings • Checking/adjusting - Pulley alignment/belt tension - Unloader - Fan blades/blower - Motors			**LO 2. Check and adjust air-conditioning accessories, controls and operating conditions.** 2.1 Clean evaporator/condenser coils in accordance with manufacturer's maintenance manual. 2.2 Check refrigerant piping for abnormal conditions based on procedure. 2.3 Check and adjust operation/controls/ settings in accordance with manufacturer's specifications. 2.4 Adjust air-conditioning accessories based on manufacturers. 2.5 Apply maintenance procedures according to manufacturer's maintenance manual.	**TLE_IARAC9-12SMP-IVb-h-58**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Safety practices in RAC works • Types of lubrication oil and characteristics • Proper procedure in system lubrication • Personal protective equipment use • Principles of RAC • Preventive and corrective maintenance • Oil levels • Oil properties • Purity of oil • Oil viscosity			**LO 3. Maintain lubrication system in PACU.** 3.1 Check and adjust lubrication system variables and components based on manufacturer's maintenance manual. 3.2 Check and adjust oil parameters based on manufacturer's specifications. 3.3 Detect and rectify oil leaks and restrictions based on standards maintenance procedures. 3.4 Dispose used oil properly according to RAC Code of Practice.	**TLE_IARAC9-12SMP-IVb-j-59**
• Pressure/temperature relationship • Function of refrigeration accessories • Types of leak detector • Principles of RAC • Effects of moisture • Checking refrigeration components, accessories and consumables			**LO 4. Maintain refrigeration system in PACU.** 4.1 Measure and analyze operating parameters based on standard specifications. 4.2 Check and record pressure and temperature drops across strainer, filters and filter driers based on standard maintenance procedures. 4.3 Perform leak testing based on RAC Code of Practice. 4.4 Check refrigeration components, accessories and consumables for contaminants in accordance manufacturer's manual or RAC Code of Practice.	**TLE_IARAC9-12SMP-Ia-e-60**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Air distribution system components design • Types/construction of blows • Types of fan motor • Principles of air distribution • Humidity equipment components • Types of air filters • Outdoor air supply system • Safety practices in RAC services • Preventive and corrective maintenance			**LO 5. Maintain air distribution system in PACU.** 5.1 Check for air distribution system components and balance airflows. 5.2 Check and maintain outdoor air supply system to meet operational and regulatory requirements. 5.3 Check, service and sanitize humidifier, equipment to meet operational and regulatory requirements.	**TLE_IARAC9-12SMP-If-j-61**
LESSON 19: SERVICING AND MAINTAINING OF COMMERCIAL REFRIGERATION EQUIPMENT (SCR)				
• Safety practices in RAC works • Tools, equipment and uses • Principles of RAC • Preventive and corrective maintenance • Interpreting work permits, job orders, and blue prints	The learner demonstrates an understanding of the basic concepts and underlying theories in servicing and maintaining commercial refrigeration equipment (CRE).	The learner independently performs servicing and maintaining CRE equipment based on industry standards.	**LO 1. Prepare for maintenance activities.** 1.1 Read and interpret work instructions to determine job requirements. 1.2 Consult appropriate manufacturer's manual if available; otherwise, standard maintenance procedures are adopted. 1.3 Select tools and equipment in accordance with job requirements. 1.4 Observe work safety according to enterprise regulations.	**TLE_IARAC9-12SCR-IIa-c-62**
• Safety practices in RAC works • Types of lubrication oil and characteristics • Proper procedure in system lubrication • Personal protective equipment use • Principles of RAC • Preventive and corrective maintenance			**LO 2. Maintain lubrication system in CRE.** 2.1 Check and adjust lubrication system variables and components based on manufacturer's maintenance manual. 2.2 Check and adjust oil parameters based on manufacturer's specifications. 2.3 Detect and rectify oil leaks and restrictions based on standard maintenance procedures. 2.4 Dispose used oil properly according to RAC Code of Practice.	**TLE_IARAC9-12SCR-IIc-j-63**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Pressure/temperature relationship • Function of refrigeration accessories • Types of leak detector • Principles of RAC • Effects of moisture			**LO 3. Maintain refrigeration system in CRE.** 3.1 Measure and analyze operating parameters based on standard specifications. 3.2 Check and record pressure and temperature drops across strainer, filters and filter driers based on standard maintenance procedures. 3.3 Perform leak testing based on RAC Code of Practice. 3.4 Check refrigeration components, accessories and consumables for contaminants in accordance to manufacturer's manual or RAC Code of Practice.	**TLE_IARAC9-12SCR-IIIa-j-64**
LESSON 20: TROUBLESHOOTING AND REPAIR OF PACKAGE-TYPE AIR-CONDITIONING UNIT (TRF)				
• Air conditioning and refrigeration electrical, mechanical symbols and diagrams • Electrical and mechanical troubleshooting guide/charts • Refrigeration tools, instruments, equipment and materials uses and specifications • Unit brand, data and specifications	The learner demonstrates an understanding of the basic concepts and underlying theories in troubleshooting PACU.	The learner independently performs trouble shooting of PACU based on industry standards.	**LO 1. Plan and prepare for troubleshooting and repair.** 1.1 Interpret appropriate wiring diagrams, charts and manuals in line with the job requirements. 1.2 Select appropriate materials, tools and equipment based on job requirements. 1.3 Check power supply to ensure compliance with nameplate rating and/or manufacturer's specifications.	**TLE_IARAC9-12TRF-IVa-d-65**
• Personal protective equipment • Refrigeration system components and its function • RAC code of practice • Preventive maintenance practice			**LO 2: Identify and overcome faults/ problems.** 2.1 Select and use appropriate PPE in line with the job requirements. 2.2 Test refrigeration system components	**TLE_IARAC9-12TRF-IVd-j-66**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Procedure on testing report practice • Faults/problems - Leakage - Contamination - Fractionation - Restriction			following manufacturer's manual, RAC Code of Practice and/or enterprise troubleshooting policy. 2.3 Diagnose faults/ problems with refrigerant system in line with manufacturer's manual, RAC Code of Practice and/or enterprise troubleshooting policy. 2.4 Take remedial action to overcome faults/problems in line with manufacturer's manual, RAC Code of Practice and/or enterprise troubleshooting policy. 2.5 Complete work safety in line with enterprise safety guidelines. 2.6 Complete report on testing procedure, including faults and repair, in line with RAC Code of Practice and/or enterprise troubleshooting policies.	
• Mechanical components and accessories, functions and specifications • Troubleshooting mechanical system procedures • Procedure recovery/recycling and retrofitting • Repair and replace procedures • Test and operating procedures • Good housekeeping and safety practices • Fundamentals of air-conditioning			**LO 3. Perform refrigerant recovery/ recycling and retrofitting on air-conditioning systems.** 3.1 Observe safe working practices throughout the task as per enterprise procedure. 3.2 Select and use suitable tools and equipment based on job requirement. 3.3 Perform optimum recovery of refrigerant in line with RAC Code of Practice. 3.4 Perform refrigerant recovery/recycling according to manufacturer's recommendations and RAC Code of Practice. 3.5 Perform retrofitting based on RAC Code of Practice.	**TLE_IARAC9-12TRF-Ia-e-67**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Operating pressure and temperature and relationship • Troubleshooting mechanical system procedures • Repair and replacement procedure • Test and operating procedures • Good housekeeping and safety practices • Fundamentals of air-conditioning			**LO 4. Test-run air-conditioning unit.** 4.1 Test air-conditioning unit in line with manufacturer's instructions. 4.2 Prepare report on testing air-conditioning unit in line with enterprise procedures.	**TLE_IARAC9-12TRF-If-j-68**
LESSON 21: TROUBLESHOOTING AND REPAIR OF COMMERCIAL REFRIGERATION EQUIPMENT (TRC)				
• Air conditioning and refrigeration electrical ,mechanical symbols and diagrams • Electrical and mechanical troubleshooting guide / charts • Refrigeration tools, instruments, equipment and materials uses and specifications • Unit brand, data and specifications	The learner demonstrates an understanding of the basic concepts and underlying theories in troubleshooting and repair commercial refrigeration equipment (CRE).	The learner independently performs troubleshooting and repair commercial refrigeration equipment based on industry standards.	**LO 1. Plan and prepare for troubleshooting and repair.** 1.1 Interpret appropriate wiring diagrams, charts and manuals in line with the job requirements. 1.2 Select appropriate materials, tools and equipment based on job requirements. 1.3 Check power supply to ensure compliance with nameplate rating and/or manufacturer's specifications.	**TLE_IARAC9-12TRC-IIa-d-69**
• Personal protective equipment • Refrigeration system components and its function • RAC code of practice • Preventive maintenance practice • Procedure on testing report practice			**LO 2. Identify and repair faults/ problems.** 2.1 Select and use appropriate PPE in line with the job requirements. 2.2 Test refrigeration system components following manufacturer's manual, RAC Code of Practice and/or enterprise troubleshooting policy. 2.3 Diagnose faults/problems with refrigerant system in line with manufacturer's manual, RAC Code of Practice and/or enterprise troubleshooting policy. 2.4 Take remedial action to overcome	**TLE_IARAC9-12TRC-IId-j-70**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
			faults/problems in line with manufacturer's manual, RAC Code of Practice and/or enterprise troubleshooting policy. 2.5 Complete work safely in line with enterprise safety guidelines. 2.6 Complete report on testing procedure, including faults and repair, in line with RAC Code of Practice and/or enterprise troubleshooting policies.	
• Mechanical components and accessories, functions and specifications • Troubleshooting mechanical system procedures • Procedure recovery/recycling and retrofitting • Repair and replace procedures • Test and operating procedures • Good housekeeping and safety practices • Fundamentals of refrigeration			**LO 3. Perform refrigerant recovery/ recycling and retrofitting on refrigeration system.** 3.1 Observe safe working practices throughout the task as per enterprise procedure. 3.2 Select and use suitable tools and equipment based on job requirement. 3.3 Perform optimum recovery of refrigerant in line with RAC Code of Practice. 3.4 Perform refrigerant recovery / recycling according to manufacturer's recommendations and RAC Code of Practice. 3.5 Perform retrofitting based on RAC Code of Practice.	**TLE_IARAC9-12TRC-IIIa-e-71**
• Operating pressure and temperature and relationship • Troubleshooting mechanical system procedures • Repair and replacement procedures • Test and operating procedures • Good housekeeping and safety practices • Fundamentals of refrigeration			**LO 4. Test-run refrigeration unit.** 4.1 Test refrigeration unit in line with manufacturer's instructions. 4.2 Prepare report on testing refrigeration unit in line with enterprise procedures.	**TLE_IARAC9-12TRC-IIIf-j-72**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
LESSON 22: PERFORMING START-UP, TESTING AND COMMISSIONING FOR PACKAGE TYPE AIR-CONDITIONING UNIT (SCP)				
• Proper procedures in start-up, test and commissioning • Tools, instruments and equipment • Personal protective equipment / safety gears • Safe handling of tools and equipment • Mechanical components and accessories • Effects of ODS emission • Montreal protocol • Data gathering • Using/calibrating/commissioning instruments - Gauge manifold - Clamp meter - Multi-tester - PsycHourometer - Electronic leak detector - Barometer	The learner demonstrates an understanding of the basic concepts and underlying theories in performing start-up, test and commissioning PACU.	The learner independently performs start-up, test and commissioning PACU based on industry standards.	**LO 1. Prepare for start-up, test and commissioning of PACU.** 1.1 Read and interpret work instructions to determine job requirements. 1.2 Select tools and equipment in accordance with job requirements. 1.3 Complete and comply pre-start-up, testing and commissioning checks with manufacturer's manuals. 1.4 Produce commissioning method and program and prepare reading sheets in accordance with manufacturer's manuals. 1.5 Calibrate commissioning instruments in accordance with system documents. 1.6 Select PPE's in line with job requirements.	**TLE_IARAC9-12SCP-IVa-b-73**
• Procedure on testing power supply • Refrigerant piping system • Types of condensing unit • Types of compressor • Perform electrical testing • Mechanical testing • Perform lubrication oil • Proper handling of refrigerant • Type of refrigerant • Electrical related checks - Power supply source checks - Power supply isolation checks			**LO 2. Conduct start-up, test and commissioning for PACU.** 2.1 Perform electrical related checks based on manufacturer's manuals. 2.2 Perform refrigerant piping related checks based on manufacturer's manuals. 2.3 Perform condensing unit related checks based on manufacturer's manuals. 2.4 Perform compressor unit- related checks based on manufacturer's manuals. 2.5 Perform indoor unit related checks based on manufacturer's manuals and site conditions.	**TLE_IARAC9-12SCP-IVb-e-74**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
- Safety and circuit protection checks - Wiring and Piping Checks - Grounding System Checks • Condensing unit related checks - Leveling and dimension validation - Spacing and positioning validation • Compressor unit related check - Connection of cranked-case heater - Oil level verification - Termination connection inspection • Indoor related checks - Condensate drain pipe inspection - Leveling and dimension verification - Air flow parameters verification - Temperature checks • Metering device related checks - Sensing Valve Tightness and Location Verification - Vibration Check			2.6 Perform metering device related checks based on manufacturer's manuals. 2.7 Charge systems with the correct refrigerant to system specifications and in accordance with manufacturer's manual. 2.8 Add appropriate lubricating oil to the air-conditioning systems in accordance with standard operating procedures. 2.9 Accomplish start-up, testing and commissioning reports in line with enterprise policies and procedures.	
LESSON 23: PERFORMING START-UP, TESTING AND COMMISSIONING FOR COMMERCIAL REFRIGERATION EQUIPMENT (SCC)				
• Proper procedures in start-up, test and commissioning • Tools, instruments and equipment • Personal protective equipment / safety gears • Safety handling of tools and equipment	The learner demonstrates an understanding of the basic concepts and underlying theories in performing start-up, test and commissioning commercial refrigeration equipment (CRE).	The learner independently performs start-up, test and commissioning of CRE equipment based on industry standards.	**LO 1. Prepare for start-up, test and commissioning of CRE.** 1.1 Read and interpret work instructions to determine job requirements. 1.2 Select tools and equipment in accordance with job requirements. 1.3 Complete and comply with pre-start-up, testing and commissioning checks with	**TLE_IARAC9-12SCC-IVe-f-75**

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE
• Mechanical components and accessories • Effects of ODS emission • Montreal protocol • Data gathering • Checking and calibrating commissioning instruments			manufacturer's manuals. 1.4 Prepare/produce commissioning method and program and recording sheets in accordance with manufacturer's manuals. 1.5 Calibrate commissioning instruments in accordance with system documents. 1.6 Select PPE's in line with job requirements.	
• Procedure on testing power supply • Refrigerant piping system • Types of condensing unit • Types of compressor • Perform electrical testing • Mechanical testing • Perform lubrication oil • Proper handling of refrigerant • Type of refrigerant • Refrigerant piping related checks • Condensing unit related checks • Compressor unit related checks • Indoor related checks • Metering devices related checks			**LO 2. Conduct start-up, test and commissioning for CRE.** 2.1 Perform electrical related checks based on manufacturer's manuals. 2.2 Perform refrigerant piping related checks based on manufacturer's manuals. 2.3 Perform condensing unit related checks based on manufacturer's manuals. 2.4 Perform compressor unit related checks based on manufacturer's manuals. 2.5 Perform indoor unit related checks based on manufacturer's manuals and site conditions. 2.6 Perform metering device related checks based on manufacturer's manuals. 2.7 Charge systems with the correct refrigerant to system specifications and in accordance with manufacturer's manual. 2.8 Add appropriate lubricating oil to the refrigeration systems in accordance with standard operating procedures. 2.9 Accomplish start-up, testing and commissioning reports in line with enterprise policies and procedures.	**TLE_IARAC9-12SCC-IVg-j-76**

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL TECHNOLOGY AND LIVELIHOOD EDUCATION AND SENIOR HIGH SCHOOL - TECHNICAL-VOCATIONAL LIVELIHOOD TRACK
INDUSTRIAL ARTS - RAC SERVICING (PACU/CRE) NC III
(640 hours)

RESOURCES			METHODOLOGY	ASSESSMENT METHOD
TOOLS	**EQUIPMENT**	**MATERIALS**		
• Push and Pull Rule • Meter stick • Spirit level/Water level • Screw driver • Pliers • Wrench box • Screw driver • Crimping tools • Bending tool • Swaging tool • Flaring tool • Tube cutters • Vernier caliper • Adjustable wrench • Open-end wrench • Multi-tester • Clamp ammeter • Megger tester • Leak detector • Defrost heater • Door strip heater • Room thermometer • System analyzer • Digital thermometer	• Masonry drill • Window type air-conditioner • Motor compressor • Fan motor • High pressure water • Electric drill • Vacuum pump • Evaporator fan and motor • Oxy-Acetylene welding outfit • Evaporator fan and motor • Defective airswing motor • Good condition airswing motors • Refrigerator and air-conditioning unit with leak piping • Overload protector • Package type A/C unit • Arc welding machine • Recovery/Recycling machine • Commercial refrigeration units • Condenser fan motor	• Form Report • Blueprint • Manufacturer's Manual • Sealant • Condensate drain • Electrical wire • Circuit breaker • Wiring diagrams • Courseware (Learning elements and manuals) • Switch • Capacitor • Relay • Philippine Electrical Code • Electrical tape • Air filters • Requisition slip • Oil • Grease • Rags • Soap • Sand paper • Refrigerant cylinder • Nitrogen gas • Personal protective equipment • Tubes (copper steel, aluminum relevant to required activity task. • Filler rolls (bronze , steel, aluminum relevant to required activity/ task • Fluxes (borax, aluminum and silver) • fittings • Nitrogen regulator Goggles • Strike lighter • Defective electrical controls	• Group discussion • Reportorial • Interaction • Self-paced learning • Discussion • Role play • Case Study • Project based method • Supervised Industry Training (OJT)	• Written examination • Practical demonstration • Observation • Interview • Work samples • Portfolio • Simulation

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL TECHNOLOGY AND LIVELIHOOD EDUCATION AND SENIOR HIGH SCHOOL - TECHNICAL-VOCATIONAL LIVELIHOOD TRACK
INDUSTRIAL ARTS - RAC SERVICING (PACU/CRE) NC III
(640 hours)

GLOSSARY

1.	Air-Cooled Condensing Unit (ACCU)/Outdoor Unit	- Equipment that condenses refrigerant vapor using air as the condensing medium. It consists of compressor, condenser coil and fan motor
2.	Air-Cooled Condenser	- Equipment that condenses refrigerant vapor using air as the condensing medium
3.	Air Handling Unit (AHU)/Indoor Unit	- Air-conditioning component that consists of a fan motor and an evaporator coil. It is this equipment used in air-conditioning that absorbs heat from the space
4.	Air Distribution	- Process of distributing conditioned air into a confined space
5.	Check	- To verify, inspect, or test an HVAC/R component for satisfactory condition with the use of an instrument or a device
6.	Commercial Refrigeration	- Covers water coolers/ display coolers, vending machine, beverage machine ice drop/ice cream/ice cube vending machines
7.	Dehydration	- Process of removing moisture from a refrigeration system
8.	Electric Heat Defrost	- Use of electric resistance heating coils to melt ice or frost from evaporators
9.	Evacuation	- Removal of air/any gas and moisture from a refrigeration system
10.	Evaporator	- Component in a refrigeration system where liquid refrigerant is changed into vapor by the absorption of heat
11.	Fan	- Mechanical device for moving air
12.	Fan Coil Unit (FCU)	- Air-conditioning component that consists of a fan motor and an evaporator coil
13.	Filter Drier	- Component part used in air-conditioning or refrigeration system to filter and dehydrates refrigerant in the system
14.	Hot Gas Defrost	- Component part used to remove frosting on the evaporator coil using hot refrigerant from the compressor
15.	Idler Pulley	- Pulley used to maintain proper belt tension
16.	Inspect	- Determine the actual condition of HVAC/R component without the use of instrument
17.	Interlocking	- Action of interconnecting electric control wires to achieve a sequential action
18.	Leak test	- Procedure of determining/pin pointing leaks in a pressurized system
19.	Liquid line solenoid valve	- Electrically operated valve that shuts-off the flow of the refrigerant to the evaporator
20.	Metering device	- One of the major components in a refrigeration system used to regulate the flow of refrigerant into the evaporator
21.	Package air-conditioning unit (PACU)/Split-Type)	- Air-conditioning unit that contains the compressor, water-cooled condenser, metering device and evaporator all of which is in one casing
22.	Pull-out	- To remove from a place of installation
23.	Pressure test	- Procedure whereby pressure is applied to the piping system, the purpose of which is to determine its soundness and stability
24.	Pump down	- Process of using the compressor to pump and contain all the refrigerant charge into the condenser and/or receiver
25.	Refrigerant charging	- Process of introducing into the system the proper amount of refrigerant
26.	Retrofitting	- Process of upgrading existing equipment or system using ozone depleting substances to environmental friendly refrigerant
27.	Service mechanic	- Worker who possess basic skills related to HVAC/R system
28.	Sight glass/liquid line moisture indicator	- Indicates refrigerant quality and charge

29.	Thermostat expansion valve (TXV)	- A refrigerant control valve connected before an evaporator that regulates flow of refrigerant. Operated by temperature and pressure, and reacts to the degree of gas superheat at the evaporator outlet tHourough a feeler bulb
30.	Transport air-conditioning unit	- Air-conditioning unit driven directly from the turning axle of the vehicle when they are in motion, or by the vehicle engine itself, or by a separate gasoline/diesel engine and/or electric motor mounted on the same vehicle. It covers the land and marine/sea transports.
31.	Troubleshoot	- Process of analyzing system defect or malfunction
32.	Vacuum	- Pressure lower than atmospheric pressure measured in inches of mercury. Complete vacuum is 29.92 in. mercury or at least 500 microns
33.	Water treatment	- The use of chemicals in water to prevent corrosion, formation of scales, algae growth and formation of slime
34.	Window type air-conditioning unit	- Self-contained air-conditioning unit house in a single casing mounted in a wall or window opening
35.	Workmanlike-manner	- Quality of work within the accepted industry standard

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL TECHNOLOGY AND LIVELIHOOD EDUCATION AND SENIOR HIGH SCHOOL - TECHNICAL-VOCATIONAL LIVELIHOOD TRACK
INDUSTRIAL ARTS - RAC SERVICING (PACU/CRE) NC III
(640 hours)

CODE BOOK LEGEND
Sample: **TLE_IARAC9-12LWC-Ia-1**

LEGEND		SAMPLE	
First Entry	Learning Area and Strand/ Subject or Specialization	Technology and Livelihood Education_ Industrial Arts RAC Servicing (PACU/CRE) NC III	**TLE_IA RAC 9-12**
	Grade Level	9/10/11/12	
Uppercase Letter/s	Domain/ Content/ Component/ Topic	Leading Workplace Communication	**LWC**
			-
Roman Numeral **Zero if no specific Quarter*	Quarter	First Quarter	**I**
Lower case letter/s **Put an en-dash (-) in between letters to indicate more than a specific week*	Week	Week one	**a**
Arabic Number	Competency	Communicate information about workplace processes.	**1**

Technology-Livelihood Education and Technical-Vocational Track specializations may be taken between Grades 9 to 12.

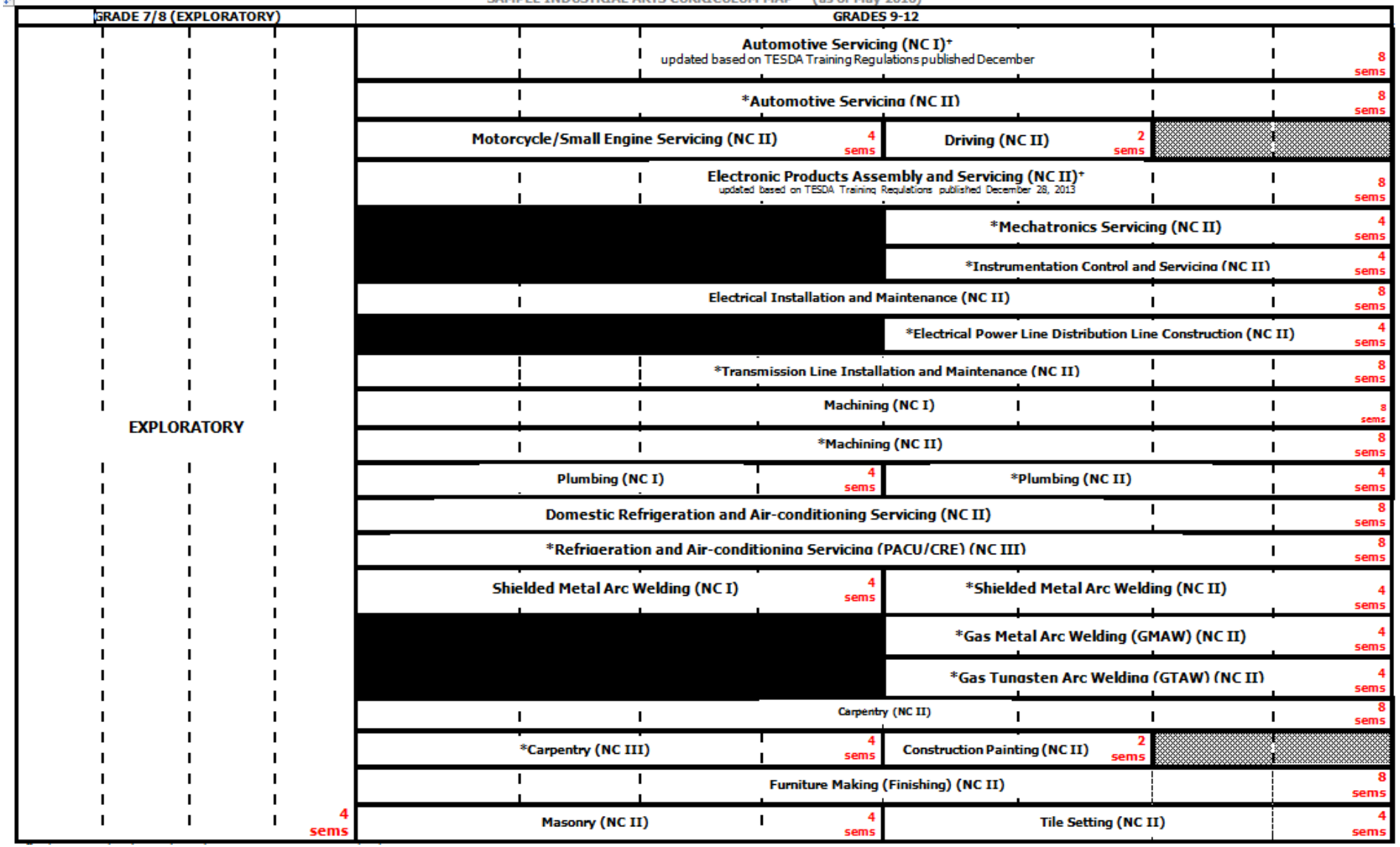
Schools may offer specializations from the four strands as long as the minimum number of hours for each specialization is met.

Please refer to the sample Curriculum Map on the next page for the number of semesters per Industrial Arts specialization and those that have pre-requisites. Curriculum Maps may be modified according to specializations offered by a school.

DOMAIN / COMPONENT	CODE
Leading Workplace Communication	LWC
Leading Small Team	LST
Developing and Practicing Negotiation Skills	DPN
Solving Problems Related to Work Activities	PRW
Using Mathematical Concepts and Techniques	MCT
Using Relevant Technologies	URT
Preparing Materials and Tools	PMT
Interpreting Technical Drawings and Plans	TDP
Observing Procedures, Specifications and Manuals of Instruction	OSM
Performing Mensuration and Calculation	PMC
Performing Basic Benchwork	PBB
Performing Basic Electrical Works	PBE
Maintaining Tools and Equipment	MTE
Performing Housekeeping and Safety Practices for Refrigeration Servicing	PHSR
Documenting Work Accomplished	DWA
Installing Package Type Air-Conditioning Unit	IPA
Installing Commercial Refrigeration Equipment	ICR
Servicing and Maintaining Package Type Air-Conditioning Unit	SMP
Servicing and Maintaining of Commercial Refrigeration Equipment	SCR
Troubleshooting and Repair of PACKAGE-Type Air-Conditioning Unit	TRF
Troubleshooting and Repair of Commercial Refrigeration Equipment	TRC
Performing Start-up, test and Commissioning for Package-Type Air-Conditioning Unit	SCP
Performing Start-up, test and Commissioning for Commercial Refrigeration Equipment	SCC

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL TECHNOLOGY AND LIVELIHOOD EDUCATION AND SENIOR HIGH SCHOOL - TECHNICAL-VOCATIONAL LIVELIHOOD TRACK
INDUSTRIAL ARTS - RAC SERVICING (PACU/CRE) NC III
(640 hours)

SAMPLE INDUSTRIAL ARTS CURRICULUM MAP** (as of May 2016)



* Please note that these subjects have pre-requisites mentioned in the CG.
\+ CG updated based on new Training Regulations of TESDA.
Other specializations with no prerequisites may be taken up during these semesters.
Pre-requisites of the subjects to the right should be taken up during these semesters.

****This is just a sample. Schools make their own curriculum maps considering the specializations to be offered. Subjects may be taken up at any point during Grades 9-12.**

Reference:

Technical Education and Skills Development Authority-Qualification Standards Office. *Training Regulations for RAC Servicing (PACU-CRE) NC III.* Taguig City, Philippines: TESDA, 2012