

NATIONAL COMPETITION 2017 STANDARDS AND SPECIFICATIONS

For the preparation and organising of all
WorldSkills South Africa Skill Competitions

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SKILL STANDARDS AND SPECIFICATIONS

Skill Categories

Construction and Building Technology

- Bricklaying
- Plastering and Drywall Systems
- Plumbing and Heating
- Refrigeration and air conditioning
- Electrical Installations

Creative Arts and Fashion

- Graphic Design Technology

Information and Communication Technology

- IT Network systems administration
- IT Software Solutions
- Web Design

Manufacturing and Engineering Technology

- CNC Turning
- Mechatronics
- Mobile Robotics
- Welding
- Aquatronics (water & waste water treatment) [*international participation to be confirmed*]

Social and professional Services

- Beauty Therapy
- Cooking
- Hairdressing
- Restaurant Services

Transportation and Logistics

- Autobody Repair
- Automobile Technology
- Car painting (Spray painting)

CONSTRUCTION AND BUILDING TECHNOLOGY

Bricklaying

Bricklayers build and repair walls inside and outside of properties as well as working on other kinds of brickwork, such as tunnel walls, chimney stacks and decorative stonework. The job of a bricklayer is to construct the first shell of a building, whether it is a house, a school, a bridge or any other construction. A good bricklayer makes the walls waterproof, weatherproof, shaped, square and secure by calling upon a variety of skills that include;

- Reading and working from, plans and specifications
- Creating decorative designs
- Sealing foundations with damp-resistant materials
- Spreading layers of mortar to serve as a base and binder for bricks in rows, designs or shapes; and spreading mortar between joints
- Repairing and maintaining clay bricks, cement blocks / bricks and related structures
- Cutting bricks to fit application

Entrants must:-

- Know and Understand,
 - Trends in the industry including new materials and construction methods
 - The essential information that must be included in construction drawings
 - The importance of checking for missing information or errors, anticipating and resolving problems in advance of the 'setting out' process and construction
 - The role and use of geometry in construction processes
 - Mathematical processes and problem solving
 - The common types of problems that can occur within a work process
 - Diagnostic approaches to problem solving
 - Methods of costing and pricing material, equipment and work processes
 - The importance of thinking 'top down' to ensure all features can be set out at the start of a project
 - The implications for the business/organization of not setting out correctly
 - The templates/building aids which may be helpful for construction
 - Calculations to assist in measuring and checking the project
 - Geometrical techniques to assist with the project
 - The impact of health and safety requirements on a project
 - The application of bed and cross joints to bricks
 - The precise cutting and laying of bricks to form ornate features and details
 - The use of hand or machine cutting techniques for different materials
 - Positioning and laying of bricks in correct positions
 - The need for all work to be presented to meet customer and related trades needs and expectations
 - The importance of joint finishing in line with the specification provided
 - Mortar setting times and absorbency rates of materials
 - Presentation includes the brushing and cleaning of brickwork plus the tidying and cleaning of the work area
 - The different techniques of applying different joint finishes
- Be able to,
 - Accurately interpret all plans, elevations, sections and enlarged details
 - Identify horizontal and vertical key dimensions and all angles
 - Identify curved work and mortar joint finishes
 - Interpret all project features and their required construction methods
 - Establish any features that need special equipment or templates and source these

- Identify drawing errors or items that require clarification
- Determine and check quantities of materials required to build specified projects
- Measure and calculate accurately
- Produce cost and time estimates
- Visualize and think through the project, identifying potential challenges early and taking the necessary preventative action
- Set out the locations, starting points and lines of projects according to plans and specifications
- Set out highly technical designs including: brick-on-end, brick-on-edge, raked/inclined, curved projecting, recessing brickwork, archways, corbelling, decorative bonding and battered walling
- Accurately interpret the dimensions from drawings and ensure the design is set out within a given tolerance
- Check all horizontal and vertical angles
- Lay first course of bricks to check all angles, curves and dimensions are correct
- Produce any templates/building aids that may be helpful when constructing
- Set out datum points of reference for the project
- Construct projects in accordance with drawings provided
- Construct template or arch supports to meet the design requirements
- Select bricks which are true to shape and angle and reject bricks which are chipped
- Construct the brickwork, maintaining accuracy in dimension to within a given tolerance
- Check dimension regularly and correct where necessary
- Maintain accuracy of level to within a given tolerance
- Transfer level accurately
- Ensure the top course is flat and smooth
- Check the underside of projecting brickwork is level
- Maintain accuracy in plumb to within a given tolerance
- Check the quality of materials
- Maintain accuracy of a horizontal, vertical or diagonal alignments to within a given tolerance
- Check alignment regularly to ensure all surfaces are flat
- Maintain accuracy in angles to within a 1mm standard tolerance
- Check angles regularly and correct where necessary
- Render small components of brickwork to a smooth and consistent finish
- Construct basic paving ensuring surfaces are flat and within a given tolerance
- Accurately fulfil the drawing interpretation
- Produce brick cuts which are straight and free of chips
- Apply joint finishes: raked, round ironed, flushed and recessed with all joints full, no holes and a smooth finish
- Produce straight lines which provide sharp edges and a crisp appearance
- Clean the brickwork to remove any trowel marks, smudges and debris is removed from the surfaces
- Leave the work area in a suitable condition for inspection and subsequent work
- Report positive and negative variances in the work process and results, together with their implications
- Organize any waste material so that it can be disposed of or recycled efficiently

Plastering and Drywall Systems

A plasterer may work on both internal and external plastering and rendering work. Much modern internal work is completed using drywall systems which involve the plasterer creating metal frames and installing plasterboard before the application on the final surface. These constructions can be complex and include curves and openings for doors and windows. Traditional plastering involves the preparation of the background prior to application of the plaster surface. The plasterer will prepare materials for use and be fully aware of legislation and official guidance relating to the preparation and use of materials. In addition to plastering flat surfaces, the skilled plasterer will create and install decorative mouldings. Plasterers will also be required to make repairs. A high degree of accuracy, care and skill is required. Preparation for plastering work will include complex mathematical calculations. The practitioner needs to be able to read, interpret and analyse complex specifications describing the work required and be able to convert these plans into reality. A range of materials can be used depending on the site and the planned use of the finished building. Some materials can be harmful, so care must always be taken by the plasterer to prevent injury or damage in use or disposal of waste.

Entrants must:-

- Know and Understand,
 - Standards and laws relating to construction of partitions and ceilings in plasterboard
 - Appropriate national standards
 - Specialist terminology
 - Construction methods including timber framed buildings
 - Framing systems used in construction of walls
 - Framing systems used in construction of ceilings
 - Screws and fastenings used in construction of walls and ceilings
 - Different types of plasterboard and fibre cement boards
 - Standards, laws and codes of practice relating to;
 - Thermal insulation in buildings
 - Acoustic insulation in buildings
 - Spread of fire
 - Safety regulations relating to the storage, handling and installation of insulation materials
 - Materials used in;
 - Thermal insulation in buildings
 - Acoustic insulation in buildings
 - Prevention of the spread of fire
 - Appropriate use of materials used in;
 - Thermal insulation in buildings
 - Acoustic insulation in buildings
 - Prevention of the spread of fire
 - Impact of building regulations
 - The influence on the green agenda and sustainability on the insulation products and techniques
 - Current and changing technologies and practices relating to insulation
 - Different methods of finishing plasterboards
 - Materials and techniques used in finishing plasterboards
 - Types of plaster and their uses
 - Types of background surfaces and their impact on plastering
 - Techniques and practices for plastering
 - Tools and equipment used in plastering

- How to complete patching and repairs
 - Cutting of internal and external mitred corners
 - Use of plaster coatings
 - Methods and principles of making decorative mouldings
 - Range and use of decorative mouldings
 - Specialist finishes such as Scagliola or Venetian Plaster and other specialist techniques
 - Adhesives used in the fitting of decorative mouldings
- Be able to,
 - Read and interpret documentation from a variety of sources
 - Interpret and work from different accepted specifications
 - Read and interpret drawings and specifications
 - Calculate materials in accordance with plans and specifications
 - Accurately measure and set out the different elements of walls and ceilings
 - Erect framing with inserts for windows and doors – square, plumb and levelled
 - Screw, fix or crimp metal components
 - Channel and stud metal profiles
 - Install curved metal work such as archways, barrelled ceilings
 - Cut and fix with adhesives and screws plasterboard sheets as well as fibre cement boards
 - Construct frames using Expanded Metal Lath (EML)
 - Install and fix acoustic products
 - Install and fix thermal products
 - Install and fix fire proof material and other materials to prevent the spread of fire
 - Use of resilient material
 - Prepare plasterboard for finishing
 - Cut beads and trims
 - Mix plastering compounds
 - Apply taping and jointing finishes
 - Apply render, float, skim and set coats to straight and curved surfaces
 - Apply smooth coat finishes
 - Repair plasterwork
 - Create internal and external mitres accurately
 - Apply and stick decorative coatings in a professional manner
 - Prepare and run in-situ moulds
 - Measure and cut components accurately
 - Cut and fix paper-faced cornices
 - Match, mitre and install cast ornamental cornices and panel mouldings including;
 - Moulds
 - Arches
 - Coving
 - Dado rails
 - Cornices
 - Skirting
 - Panel moulds
 - Ceiling roses
 - Repair decorative mouldings

Plumbing and Heating

A plumbing and heating technician works on commercial, residential, agricultural and industrial projects. He or she will plan and design, select and install, commission, test, report, maintain, fault find and repair systems to a high standard.

Entrants must:-

- Know and Understand,
 - The purposes, uses, maintenance and care of all equipment, together with their safety implications
 - The purposes, uses, care and potential risks associated with materials and chemicals
 - The purposes and uses of manufacturers' specifications and drawings
 - Search methods for specific and non-specific information, specifications and guidance
 - The range and purposes of documentation, including text, graphical, paper based and electronic
 - Drawing notation and the symbols for pipe work, fittings and appliances
 - The technical language associated with the skill
 - The health and safety standards applying at any one time
 - The use of new technologies as a work aid
 - Principles and their application to good housekeeping in the work environment
 - The uses and limitations of the specified bending and jointing methods, materials and fittings in order to complete a leak-free installation
 - Methods of connection to services from utilities provider
 - The range and characteristics of bending/jointing methods, materials and fittings
 - Properties of the piping material available
 - The safe operation of the cutting, bending, threading, soldering, welding and testing equipment provided
 - The applications appropriate to:
 - Pre-wall (boundary) installation systems
 - Surface wall installation
 - Hot water installations
 - Cold Water Installations
 - Heating systems
 - Rainwater Harvesting/grey water systems
 - Under floor heating
 - Solar Thermal water heating (thermo siphon / forced circulation)
 - Heat pump installations
 - Gas installations (gas water heaters)
- Be able to,
 - Design installation systems within given parameters
 - Produce simple freehand sketches including isometric to support given architect drawings to aid install process, using standard conventions and symbols
 - Estimate the requirement for equipment and materials
 - Select the equipment and materials according to given criteria, including price
 - Read and interpret drawing for a range of systems and appliances
 - Interpret drawings to facilitate pipe-work fabrication and the installation of appliances

- Modify the area and surfaces, as required, to permit fixing and assembly
- Take and transfer measurements and angles from given drawings to surfaces and piping materials
- Select suitable fixing methods for the available surfaces, appliances and environment
- Fix an appropriate number and diameter of pipe brackets/clips in the correct or specified configuration
- Determine the optimal way to use the given materials to complete the assembly in a sustainable manner
- Create freehand sketches for the purposes of pipe bending and assembly
- Limit the generation of scrap and waste
- Determine and use the correct positions for cutting the piping material
- Measure, set out and mark the materials and pipe-work
- Determine the correct positions for bending the piping material
- Select an appropriate method and safe method for cutting the piping material
- Utilize the chosen method to bend the piping material safely
- Utilize the chosen jointing method to form the pipe-work sub-assemblies
- Install the pipe-work sub-assemblies utilizing the previously fitted brackets/clips
- Connect the pipe-work to the appliances/utilities
- Build up gas, water, heating and effluent pipe installations
- Process commercial materials into installations
- Perform all pre-commissioning/commissioning tasks
- Connect test equipment to the pipe-work
- Pressure test the pipe-work to ensure conformity to specification
- Flush and drain the installation
- Sterilize the installation as per specifications
- Fill the pipe-work and appliance and assess the flow rate/pressures to specifications
- Hand over the installation to the customer including documentation
- Provide the customer with all appropriate user information and answer questions

Refrigeration and Air Conditioning

A refrigeration and air conditioning engineer works on commercial, residential, public and industrial projects, including transportation and storage. The refrigeration and air conditioning engineer generally works inside domestic, commercial or public buildings during and after construction and production, and on projects of all sizes and types. He or she will plan and design, install, test, commission, report, maintain, fault find and repair systems to a high standard. The individual will ensure a safe and reliable installation and maintenance service, in accordance with relevant standards, through to diagnosing malfunctions, upgrading and commissioning, and fault finding and correction.

Entrants must:-

- Know and Understand,
 - The standard units of measurement used in the RAC industry
 - The properties of materials in the RAC industry
 - The relationship and interactions of energy, heat and power
 - Principles of force and pressure and their application to RAC industry
 - Principles of electricity and control circuits as related to RAC industry
 - The detailed properties of fluids used in RAC industry
 - The refrigeration and heat pump cycle
 - Condensate drainage and secondary refrigerant circuits
 - The information requirements for the design of a refrigeration or air conditioning system
 - The principles and conventions used in specifications and drawings
 - The range of specifications and drawings in use, and their purposes
 - The uses and limitations of the generally available drawing tools
 - The types and use of electrical cables and devices for different applications
 - Specific health and safety requirements that apply to fitting and fixing, servicing, maintaining and decommissioning RAC systems
 - The working principles and layouts of RAC and heat pump systems
 - The procedure for fitting, fixing and testing materials, equipment and components in RAC systems
 - The service and maintenance procedures for RAC systems, equipment and components
 - How to interpret the design parameters of the given systems
 - Safety standards relating to the handling and application of refrigerants
 - Safe procedures for applying electrical supply to RAC systems
 - How to set up safety controls and devices to satisfy design requirements
 - How to ensure the integrity of RAC systems
 - How to ensure efficient operation of a system
 - The electrical standards that apply to the RAC industry
 - The inspection and testing requirements of electrically operated RAC services and components
 - The procedures for safely diagnosing and rectifying faults in electrically operated RAC services and components
 - The layout and features of electrical circuits in RAC systems
 - The procedure for safe isolation of the specific systems

- Be able to,
 - Read, interpret and extract technical data and instructions from manuals and other documentation
 - Appraise the purposes of the required systems
 - Appraise the feasibility of locating the system within designated areas
 - Calculate relative density to air and water
 - Apply specialist knowledge of the principal applications, detailed properties and reasons why solid materials break down
 - Apply the principal applications and basic properties of fluids used in the RAC industry
 - Use the terminology associated with latent, sensible heat and fluid change of state
 - Carry out simple heat energy and power, force and pressure calculations
 - Carry out simple electrical calculations i.e. ohms law, power consumption, voltage, current and resistance circuits
 - Design an efficient refrigeration system that includes a range of heat exchangers and refrigerant types; HFC, HC and those with low or zero ODP and GWP
 - Design an air conditioning system that would serve a comfort cooling application and also a full building application
 - Produce simple drawings and specifications including 3D and scale, using standard conventions and symbols.
 - Interpret diagrams, plans and specifications for piping and electricity routes
 - Work safely with gas heating equipment in the RAC industry
 - Prepare and if need be improve the area and surfaces which the installation depends upon
 - Itemize the required tools, components and materials required for installation
 - Take and transfer measurements and angles from given drawings to surfaces and piping materials
 - Identify, check and use various types of gases and equipment used for joining materials in the RAC industry
 - Join similar and dissimilar materials commonly found in refrigeration and air conditioning systems using a range of permanent and accessible jointing methods
 - Fabricate and install mechanical materials and components according to drawings and specifications
 - Install electrical materials components and control devices according to drawings and specifications
 - Install ancillary components and systems found in refrigeration and air conditioning systems such as condensate drainage, and leak detection systems
 - Use tools and equipment to pressure test the system and ensure no leaks
 - Use tools and equipment to evacuate the system of non-condensable fluids
 - Charge the system with the correct type and quantity of refrigerant for efficient operation
 - Assess the refrigeration system for correct operation
 - Assess the air conditioning system for correct operation
 - Assess any secondary refrigerant or cooling system for correct operation
 - Assess the refrigeration or air conditioning system electrical installation for correct operation

- Adjust refrigerant controls and flow devices for optimal system performance
- Adjust electrical and electronic controls for optimal system performance
- Balance the air distribution systems
- Measure and record the RAC system operating parameters
- Ensure the availability of essential client documentation
- Demonstrate the safe functioning and care of the system to the client
- Hand over the system to the client, while responding to all relevant queries
- Inspect and test electrically operated RAC system components
- Safely diagnose and rectify faults in electrically operated RAC services and components
- Prepare and safeguard the area of work and its surroundings
- Carry out safe isolation of electrical systems
- Assess the refrigerant system for integrity and correct operation
- Replace faulty refrigerant system components
- Assess the air distribution system for integrity and correct operation
- Replace faulty air distribution components
- Evaluate electrical wiring integrity prior to energizing
- Assess the electrical installation for correct operation
- Reclaim HFC and HC refrigerant from systems
- Drain and refill compressor lubricant
- Restore the work area and its surroundings to its prior state
- Explain, advise and report on findings, actions and matters requiring further attention

Electrical Installations

An electrician works on commercial, residential, agricultural and industrial projects. He or she will plan and design, select and install, commission, test, report, maintain, fault find and repair systems to a high standard.

From working to provide a safe and reliable electrical installation and maintenance service, in accordance with relevant standards, through to diagnosing malfunctions, programming and commissioning home and building automation systems.

Entrants must:-

- Know and Understand,
 - Single phase and three phase electrical systems
 - Ducting and wiring systems for commercial, domestic, residential agricultural and industrial use and when and where to use a specific ducting and/or wiring system
 - The range of electrical switchboards used for commercial, domestic, residential, agricultural and industrial uses and when and where to use a specific switchboard system
 - Types of electric lighting and heating systems for commercial, domestic residential and industrial use
 - Control devices and socket outlets used for commercial, domestic, residential, agricultural and industrial uses
 - Structured cabling systems including: computer network cabling, all types and sizes of cabling systems used in single phase and three phase electrical systems
 - Regulations and standards applicable to different types of electrical installations
 - Inspection and verification standards, methods and reports to be used to record inspection and verification results
 - Types of measuring instruments
 - Tools and software used for, programming and commissioning
 - The correct operation of the electrical installation in accordance with the planned specification and customer requirements

- Be able to,
 - Install single phase and three phase electrical system components
 - Select and install equipment and wire ways as per drawings and documentation provided
 - Install ducting and cabling systems on different surfaces as per manufacturer's instructions and current industrial standards
 - Select and install single and double insulated cables inside ducts, conduits and flexible conduits
 - Install and securely fix double insulated cables onto cable ladder, cable tray and different surfaces as per manufacturer's instructions and current industrial standards
 - Install metal and plastic ducting (trunking): accurately measure and cut duct at specified lengths/angles; assemble without distortion to joints and to specified tolerances
 - Assemble different termination adaptors, including glands onto duct and attach ducts, of different types, securely onto a surface
 - Install metal and plastic conduits/flexible conduits and attach securely onto surface, maintaining even radius bends, without distortion to conduit
 - Correct termination adaptors used for entry of conduits into boxes, boards and ducts
 - Install and securely attach different types of cable ladder and cable tray to a surface

- Install electrical switchboards onto a surface in a secure way and assemble switchboard apparatus in a switchboard as per layout drawings/instructions to include: main switches, RCDs, MCBs, fuses, controlling equipment such as relays and timers and other devices
- Terminate and install wiring inside a switchboard according to circuit drawings
- Connect equipment as per instructions provided to include: structured cabling systems as per manufacturer's instructions and current industrial standards and regulations
- Install cabling systems including: all types and size cabling systems used in single phase and three phase electrical systems
- Test installations before energizing to ensure personal and electrical safety to include: insulation resistance and earth continuity tests, correct polarity and complete a visual inspection
- Test installations when energized by checking complete function on all equipment installed to ensure correct operation of new installation as per instructions
- Set-up equipment to include: selecting and using the appropriate software for programming programmable relays, creating necessary settings on devices such as timers and overload relays; programming programmable controllers: downloading and importing applications required and programming
- Set the installation to fully functioning and ensure customer can operate

CREATIVE ARTS AND FASHION

Graphic Design Technology

Graphic Design Technology comprises many different skills and disciplines in the production of graphic design and output. The diversity of the skills required in the industry is very broad. Graphic Design Technology involves working with external and internal clients to create solutions to their needs; it may also include the printing or online publication production. People working in this industry often work closely with their clients and must be strong communicators so that they can achieve the client's objectives successfully. They require strong interactive, research, design and technical skills. In order to have these they need to understand the target audience, markets, trends and cultural differences and what the client wants. After completing the research and planning stage, a project is interpreted to form a design in appropriate industry specific software. The design must be set up with the correct technical specifications for output or online publication. It is essential that practitioners understand all phases of the procedure including the constraints of the specified printing process. These skills also apply to redesigning or updating a design.

Entrants must:-

- Know and Understand,
 - Creative trends and developments in the industry
 - How to apply appropriate colours, typography and composition
 - Principles and techniques for adapting graphics for various uses
 - Different target markets and the elements of design which satisfy each market
 - Protocols for maintaining a corporate identity, brand and style guide
 - How to provide consistency and refine a design
 - Principles of a pleasing and creative design
 - Current design trends
 - Design principles and elements
 - Standard sizes, formats and settings commonly used in the industry
 - Technological trends and developments in the industry
 - Different printing processes: their limitations and techniques
 - Standards for client presentation
 - Image manipulation and editing
 - Appropriate file formats, resolution and compression
 - Colour gamuts, spot colours and ICC profiles
 - Printers marks and bleed
 - Dielines and varnishes
 - Software applications
 - Different types of paper and surfaces
- Be able to,
 - Create, analyse and develop a visual response to communication problems, including understanding hierarchy, typography, aesthetics and composition
 - Create, manipulate and optimize images for both print and online publishing
 - Analyse the target market and the product being delivered
 - Create an idea that is appropriate to the target market
 - Take into consideration the impact of each element that is added during the design process
 - Use all the required elements to create the design
 - Respect existing corporate identity guidelines and style guides

- Keep the original design concept and improve the visual appeal
- Transform an idea into a pleasing and creative design
- Create prototype mock-ups for presentation
- Mount for presentation standard
- Apply the correct and appropriate adjustments for the specified printing process
- Adjust and manipulate images to suit the design and technical specifications
- Apply the correct colours to the file
- Save files in the correct format
- Use software applications comprehensively and appropriately
- Organize and maintain folders (for final output and archiving)

INFORMATION AND COMMUNICATION TECHNOLOGY

IT Network Systems Administration

IT Network Systems Administrator's work in small or large organizations in the commercial and public sectors, offering a wide range of IT services which are critical for the operation of daily business.

Any 'downtime' is costly for an organization therefore the IT Network Systems Administrator has a responsibility to work professionally and interactively with users in order to meet their needs and ensure continuance of the systems and service levels they require to perform their roles effectively.

The IT Network Systems Administrator works in diverse environments including network operations centres, internet service providers, data centres e.g. Amazon and climate-controlled server rooms. He or she offers a wide range of services based on;

- User support
- Troubleshooting
- Design
- Installation/upgrading
- Configuration of operating systems and network devices.

Entrants must:-

- Know and Understand,
 - Microsoft Windows PC and Server OS
 - Linux Debian PC and Server OS
 - VMware/ VSphere
 - Cisco IOS
 - Packet Tracer version 6.2
 - Routers and Switches
 - ASA Firewalls
 - Cisco IP Phones
 - Computers and Servers
 - Cabling, Cable types and cable standards
 - Competitor must understand how to follow troubleshooting processes using different methods (Top-down approach, Divide and Conquer and Bottom-up)
 - Install and Configure Linux OS
 - Install and Configure Windows OS
 - Migrate from one OS version to another
 - Fully functional network topology
- Be able to,
 - Connect devices and build network topologies as per diagram
 - Install Operating Systems
 - Configure devices e.g. PC, Routers, switches etc.
 - Troubleshoot Network
 - Network Protocols
 - Be comfortable with Hardware and Software Administrations
 - Erase and reload devices
 - Work on CLI and GUI
 - Follow instructions on Test projects
 - Design Network topology using VMware
 - Work with AD and GPO
 - Create and administer user accounts on Servers
 - Move users and data from one system to another without data loss

- Install, configure and maintain operable devices
- Fix errors where necessary
- Alter the network structure where required
- And Troubleshoot configuration errors
- Check and verify full network operations and convergence

IT Software Solutions For Business

The rapid pace of globalization over the past decade has been largely driven by developments in Information and Communication Technology (ICT). IT specialists are increasingly in great demand in several areas, one of which is providing software solutions for business.

The development of software solutions to improve business productivity encompasses many different skills and disciplines. Key to these is an awareness of the fast changing nature of the industry and the ability to keep up with the rapid pace of change.

IT software solution professionals always work closely with clients to modify existing systems or create new systems. They may modify “off the shelf” software and integrate it into the existing systems. They often work as part of a team of software professionals responsible for the requirement specification, system analysis and design, construction, testing, training and implementation, as well as maintenance of a business software system.

The tasks performed by IT software solution professionals include but not limited to the following:

- Review current system and present ideas for improvement, including cost benefit analysis
- Analyse and specify user requirements
- Produce detailed specifications
- Develop software system for the required solution and test the software solution thoroughly
- Prepare user training materials, train users, and present software solution to users
- Install, implement and maintain the software system

Web Design

Web Design encompasses many different skills and disciplines in the production and maintenance of websites. Web Design involves implementing specific solutions that follow the business rules and objectives outlined by the client. Web Designers develop a deep understanding of the requirements and convert these into a website specification. Strong design and communication skills, coupled with research techniques and a grasp of target audiences, markets and trends, will ensure initial client satisfaction and credibility for the Web Designer.

Having completed the website planning and design, the Web Designer then integrates the website with third party tools and platforms. During the development process web designers design and develop the databases, create programs, tests and debug the website. The current trend is to also integrate the website with Social Media and take advantage of the leverage these modern platforms bring.

All these skills may apply equally to the re-design or an upgrade of an existing website.

Entrants must:-

- Know and Understand,
 - Issues related to the cognitive, social, cultural, technological and economic contexts for design
 - How to create graphics for the web
 - How to create a design using a provided brief and specification
 - How to follow design principles and patterns
 - Which skills are required to design to utilize of colours, typography and composition
 - Principles and techniques for adapting graphics for use in website layouts
 - Different target markets and the elements of design which satisfy each market
 - Protocols for maintaining a corporate identity, brand and style guide
 - The limitations of Internet enabled devices and screen resolutions
 - How to provide consistency and polish to a finished design
 - Principles of an aesthetically pleasing and creative design
 - Current design trends
 - Best practice for accessibility and communicating with audiences with special needs
 - World Wide Web Consortium (W3C) standards for HTML and CSS
 - Website layout methods and standard website structures
 - Web accessibility initiative (WAI)
 - How to identify appropriate CSS rules and selectors to be applied to obtain the desired result
 - How to identify requirements for people with disabilities, including visual, auditory, physical, speech, cognitive, and neurological disabilities
 - Best practices for Search Engine Optimization (SEO)
 - How to embed and integrate animations, audio and video
 - How to integrate JavaScript
 - How to create code with Open Source Libraries and Frameworks
 - How to develop PHP (Hypertext Pre-processor) code
 - How to utilize Open Source server side Libraries and Frameworks
 - Data-modelling techniques to design and implement databases with MySQL
 - FTP (File Transfer Protocol) server and client relationships and software packages.
 - How to implement web services using PHP, XML (Extensible Mark-up Language) and JSON
 - Programming control structures (object-oriented programming)

- How to develop code that follows design pattern (E.g.; MVC (Model View Controller))
- How to create secure web applications
- Be able to,
 - Create, analyse develop visual response to communication problems, including understanding hierarchy, typography, aesthetics and composition
 - Create, manipulate and optimize images for the internet
 - Analyse the target market and the product being delivered
 - Select an idea that is most appropriate to the target market
 - Take into consideration the impact of each element that is added during the design process
 - Use all the required elements to create the design
 - Respect existing corporate identity guidelines and style guides
 - Create responsive designs that function correctly on multiple screen resolutions and/or devices
 - Keep the original design concept and amplify its visual appeal
 - Transform an idea into an aesthetically pleasing and creative design
 - Use problem-solving skills to accommodate user groups with special needs
 - Use CSS in the most efficient and effective way for consistency between web browsers
 - Create web pages that function on a variety of devices and screen resolutions
 - Maintain consistency of layouts on multiple screen resolutions
 - Create websites that comply with current W3C standards (<http://www.w3.org>) and current W3C last call drafts.
 - Use CSS or other external files to modify the appearance of the website
 - Create and update websites to assist with Search Engine Performance
 - Create code that conforms and validates to the W3C standards
 - Create website animations to assist in context explanations and adding visual appeal
 - Create and update JavaScript code to enhance a websites functionality and aesthetics
 - Add interactivity to websites
 - Develop and design database queries and web services to match client requirements
 - Deliver a robust solutions to fulfil specific database requirements
 - Translate an ER (Entity-Relationship) diagram into a functioning database
 - Create an SQL (Structured Query Language) statements using correct syntax
 - Protect against security exploits
 - Integrate with existing code with API (Application Programming Interfaces), libraries and frameworks
 - Develop object-oriented code

MANUFACTURING AND ENGINEERING TECHNOLOGY

CNC Turning

Each part of an assembly is made of different materials, and needs different geometries, dimensions and surface qualities. The engineer brings all these requirements into technical drawings which are called “blueprints”.

A CNC Lathe is a machine on which material turns around an axis at high speed, and where cutting tools driven by computer software are moved to cut away excessive material to get the expected part. The CNC Turning Machinist receives the blueprint, then he/she uses the Lathe in many ways to find solutions in order to build the part. These machines are very expensive, because they can do remarkable things. To have an idea of this, think what it means to achieve accuracy below 10 microns, which is six times thinner than a human hair.

The CNC Turning Machinist has to use a computer to tell the Lathe how to move the tools and cut the part. He/she also has to set up the Lathe with all the cutting tools. These tools can cut almost every material (stainless steel, plastic, soft steel, aluminium, bronze, and so on) but we have to choose well.

We also choose the clamping method. This is where the material will be held firm. When the machine starts cutting material, the Machinist makes sure that the dimensions exactly fit the blueprint specifications.

Entrants must:-

- Know and understand,
 - ISO E and/or ISO A (European and American) drawing representation
 - Technical terms and symbols used in drawings and plans
 - Technical data sheets
 - Drawing legends
 - How to Prepare and write a CNC programme - drawing using simulation software
 - Interpret drawings and documentation and define tool path geometry
 - The properties, uses and handling of material
 - Tool steel
 - Mild steel
 - Aluminium
 - How to manufacture components using the correct set up and clamping procedures
 - Tool set up procedures for tool geometry

- Be able to,
 - Locate and identify dimensions and tolerances
 - Locate and identify ISO standards surface finish requirements
 - Locate and identify ISO standards geometric specifications
 - Make 3D mental representations of the parts
 - Identify the materials that parts are made of
 - Visualize the parts inside the raw material
 - Prepare and write a CNC program for a drawing using simulation software
 - Determine tool path geometry
 - Calculate tool path coordinates
 - Calculate correct speeds and feeds for tools used

Mechatronics

Mechatronics technicians build automated systems for industry. Mechatronics involves mechanics, electronics, and pneumatics and computer technology. The computer technology element covers information technology applications, programmable machine control systems, and technology which enable communication between machines, equipment and people. Mechatronics combines skills in mechanics, pneumatics, electronically controlled systems, programming, and robotics and systems development. Mechatronics technicians design, builds, maintain and repair automated equipment, and also program equipment control systems.

Entrants must be able to:-

- Understand structure, components and operation of;
 - Pneumatic and electro-pneumatic systems
 - Hydraulic and electro-hydraulic systems
 - Electrical drives, including the types of motors
 - Robots (eg industrial arm)
 - PLC and HMI
 - Handling systems
 - Transport systems such as conveyors
 - Production systems
- Select and safely operate equipment according to their specifications
- Identify and resolve problems relating to faulty or abnormal operation of equipment.
- Maintain equipment and prepare equipment for safe use.
- Assemble components, machines and systems according to documentation
- Know and understand,
 - The functions, structures and operating principles of PLC and HMI
 - The functions and structures of industrial controllers HMI
 - The configuration of the industrial controller and HMI
 - The methods by which software programs relate to the actions of machinery
 - How to program using standard industrial software
 - How a software program relates to the action of machinery and systems
 - The principles and applications for circuit design
 - Methods for designing and assembling electrical circuits in machine and controller systems
- Connect PLCs and HMIs to Mechatronics systems
- Make the necessary configurations of industrial controllers and HMIs
- Configure all aspects of PLCs and HMIs as required, together with the associated control circuitry for correct operation
- Write programs to control a machine
- Visualize the process and operation using software
- Program PLCs, including digital and analogue signal processing and industrial field buses
- Design pneumatic, hydraulic and electrical circuits

Mobile Robotics

Mobile Robotics is a fast evolving, solutions orientated, industry within which the robotics engineer is a significant and growing work role. Mobile robotics is an important part of the industry, with applications in diverse industries, including manufacturing, agriculture, aerospace, mining, and medicine. Mobile robots may also be designed to explore areas that are inaccessible or dangerous for human beings.

Once a need is established the design phase follows and a prototype is assembled. The robot is then programmed and tested to ensure high, consistent performance. At the heart of every robot is a robotics engineer who thinks about what a robot needs to do and works with several engineering disciplines to design and put together the optimal piece of equipment.

The robotics engineer uses existing technologies to create solutions to new challenges and must be familiar with logic, microprocessors, and computer programming so that the design ensures the right robot for each application. Specifications must then be prepared for the robot's capabilities as they relate to the work environment. In addition, robotics engineers are responsible for cost efficient design, cost-price calculations and quality-control.

Welding

A welder prepares and joins a range of metals of various gauges using electrical and electrical/gas shielded processes. A welder needs to be able to interpret engineering drawings; standards and symbols correctly translate these requirements into accurate structures and products.

Welders join sections, pipe and plate and fabricate large and small pressure vessels. A welder prepares, assembles and joins a wide range of metals and metal alloys using various welding processes including MMAW (manual metal arc welding), MAGSW (metal arc gas shielded welding), SMAW (Shielded Metal Arc Welding), GMAW (Gas Metal Arc Welding), and GTAW (Gas Tungsten Arc Welding). They use gas, electrical, and gas shielded electrical processes to join and cut a wide range of materials. They must be able to choose and operate the correct equipment, process and methodology depending upon the material being joined.

Entrants must be able to:-

- Understand Weld Symbols to both AWS and ISO Standards
- Understand weld joint detail and dimensioning
- Use industrial welding equipment and adjust settings to WPS requirement.
- Safely use industrial power tools
- Prepare and assemble the test projects in accordance with drawings
- Apply all four welding processes (GMAW, SMAW, GTAW, FCAW)
- Be able to weld in all positions with all processes (1F – 4F and 1G – 6G)
- Be able to weld Carbon steel, Stainless steel and Aluminium in all positions with all four processes.

Aquatronics (Water and Waste Water Treatment)

Aquatronics specialists work in most fields throughout the whole water cycle in commercial, municipal and industrial locations. Aquatronic specialists are entrusted with preservation of the world's most precious resource: water. As with most of nature's resources, a direct treatment (without automated machines or equipment) is impossible. Governments and companies make large investments into the equipment required for the treatment of water (be it water or wastewater). Such equipment is increasingly automated to ensure consistent quality and results. Aquatronics is a team skill with 2 Competitors per team. Team composition may include a mechanical/electrical systems specialist responsible for the safe operation, maintenance and supervision of automated equipment, capable of interpreting P&I circuit plans, assembly/disassembly of mechanical equipment, commissioning/de-commissioning and repair of electro-mechanical equipment (i.e. electrical pumps), structured fault finding/solving, select alternative equipment (based on function and not brand); and an environmental specialist responsible in the practical aspects of operating and maintaining water and wastewater treatment plants, emphasizing safe practices and procedures, assess potential danger to the environment, analysing/evaluation of chemical/biological levels/contents within water/wastewater, like basic knowledge of: pure oxygen activated sludge treatment, residual solids management, biological control of nitrogen, and if necessary take action or make recommendations as well as problem solving in most water and wastewater treatment plants.

Entrants must:-

- Know and Understand,
 - The technical language associated with the skill
 - The standards required for routine and exception reporting in oral, written and electronic form (i.e.: values, figures, units, minimal information, recommendations, etc.)
 - The required standards for communication with clients, team members and others
 - The purposes and techniques for generating, maintaining and presenting records
 - Assembling and commissioning of pumps and pipeline systems
 - Components and functions of pumps
 - Components and functions of electrical systems
 - Components and applications of pipelines and related equipment
 - Components and applications of process control systems
 - Basic processes (and the principles behind them) with regard to water and wastewater treatment
 - Principles and applications of design and assembly of mechanical systems including pneumatic and/or hydraulic systems, their standards and their documentation.
 - Basic structure and the life settings of relevant microorganisms within water and wastewater.
 - Circuit- and P&I- diagrams as well as operating manuals and/or instruction manuals.
 - The logical sequence of purification steps, along with all the circuits according to the given facts.
 - How to structure and present given water and wastewater systems.
 - Manually monitor, control and regulate systems or with the help of control and communication systems.
 - How to read circuit diagrams, assemble, modify and commission mechanical equipment in general.
 - The basic calculations required within water and wastewater treatment processes
 - The basics and principles of sample taking

- The basics and principles of measuring samples
 - Basic principles of chemical analysis
 - Basic principles of biological analysis
 - Criteria and methods for testing equipment and systems.
 - Analytical techniques for fault finding.
 - Techniques and options for making repairs.
 - Develop strategies for problem solving.
 - Principles and techniques for generating creative and innovative solutions.
 - What water loss is, its causes and potential solutions for prevention
 - To identify high energy consumers and develop energy efficiency strategies.
 - The different components within a simple pneumatic and hydraulic application (i.e. valves, cylinders, actuators, etc.)
 - Analytical techniques for fault finding
 - Basics of fluid mechanism
 - The basics of control technology and most common systems
- Be able to,
 - Read, interpret and extract technical data and instructions from documentation in any available format
 - Use a standard range of communication technologies
 - Discuss complex technical principles and applications with others
 - Complete reports and respond to issues and questions arising
 - Safely disengage an electrical pump (0-400V - DC/AC) used within water and wastewater treatment/transportation.
 - Identify and resolve areas of uncertainty within the briefs or specifications.
 - Disassemble and re-assemble a pump.
 - Use knowledge of pumps for proper and timely maintenance and repair.
 - Connect wires and tubes according to industrial standards.
 - Install, set up and adjust/calibrate the mechanical, electrical and sensor systems as required.
 - Perform calculations based on given facts.
 - Identify potential problem zones and devise remedies accordingly.
 - Correctly take samples
 - Correct use of laboratory equipment
 - Follow chemical and biological analysis protocols
 - Properly document results/findings
 - Repair components efficiently.
 - Monitor and control process relevant equipment
 - Properly adjust and/or calibrate different types of sensors if necessary, according to instruction manuals.
 - Efficient use of accessories (minimize waste of: tubing, piping, seals, etc...)
 - Ensure the correct function of the system (function, no leakage, etc...)
 - Ensure correct connection of all wiring according to the circuit diagram.
 - Ensure correct function of the electrical system (i.e.: rotation direction)
 - Correctly adjust all parameters
 - Correctly identify cost drivers and define methods for its minimization
 - Identify equipment that requires preventive maintenance and develop/take appropriate measures
 - Correctly identify cost drivers and define methods for its minimization
 - Understand, interpret and differentiate circuit diagrams
 - Correctly regulate and adjust valves for efficient use

SOCIAL AND PROFESSIONAL SERVICES

Beauty Therapy

A beauty therapist generally works in the commercial sector, offering specialist services, treatments and advice for the skin, body care, massage and make-up of individual clients. The beauty therapist works in diverse environments, including large or small salons within leisure and health related organizations. The specialist services and treatments offered by the beauty therapist relate to the: face, body, feet, hands and nails.

Entrants must:-

- Know and Understand
 - Anatomy and Physiology of all face and body areas
 - Body types, muscle tone, skin structure and related medical condition
 - Health, safety and hygiene legislation, rules and regulations as they apply to the Beauty Therapy industry
 - The importance of Professional demeanour
 - How professional demeanour and presentation is essential for building positive client and colleague relationships
 - The significance of self-management and presentation for the comfort and reassurance of the client
 - The importance of client comfort, modesty and discretion
 - The importance of carrying out a comprehensive client consultation and analysis prior to all treatments.
 - The significance of listening carefully to the client and questioning closely to aid analysis and accurate interpretation of client wishes
 - The requirement to keep records relating to clients, products and other relevant matters.
 - Treatment Precautions and Contra-indications and the reasons why a beauty therapist would not undertake a treatment.
 - Contra-actions which can occur during a treatment and how they should be managed
 - The range and purposes of tools, equipment and electrical instruments used for each of the various beauty treatments and how to use, maintain and store them safely and securely
 - The purposes, uses, care and potential risks associated with products, cosmetics and their ingredients
 - Post treatment care and home care advise
 - The importance of always following manufacturers' instructions
 - The professional ethics when dealing with referrals from medical specialists
 - The principles of ergonomics
 - The time required for each beauty therapy treatment
 - Temporary hair removal techniques
 - Products and equipment required to undertake a range of hair removal procedures on the face and body including Sugaring, hot and strip waxing techniques
 - The importance of practicing correct hygienic procedures when dealing with blood and bodily Fluids
 - Importance of aftercare advise
 - Facial Treatment techniques, purpose ,care and uses
 - Station preparation for Advanced Facial Treatment
 - The problems related to the use of chemicals near the eyes
 - The importance of following safety procedures in using and maintaining electrical instruments
 - Different skin conditions and how they should be treated

- The different types and colours of make-up products for desired outcome
 - Eyebrow and eyelash treatment Techniques, products, use and safety precautions
 - The range of body massage treatments
 - The range of mechanical massage techniques
 - Cultural differences and requirements
 - The nature, purpose and use of essential oils
 - Feet, hand and nail treatments
 - Nail and skin infections/problems – hands and feet
 - Manicure and pedicure procedures and treatments
 - Maintenance and repair of natural and artificial nails
 - Artificial nail applications
 - New nail vogues and styles
- Be able to,
 - Prepare treatment area and equipment according to health, safety and hygiene requirements to promote maximum efficiency for all beauty therapy treatments
 - Meet, greet and settle clients in a professional and welcoming manner.
 - Take into consideration client comfort and modesty for all treatments
 - Create an inviting and relaxing ambience to provide client safety and comfort
 - Conduct a visual and manual examination and complete report card
 - Recognize contra indications during the consultation and respond to them
 - Maintain positive contact with the client throughout the treatment
 - Identify any contra actions during treatments and respond to them appropriately
 - Seek feedback from the client before concluding the treatments
 - Recognize and understand problems swiftly and follow a self-managed process for resolving
 - Prepare and test hair removal wax to hygiene specification
 - Accurately assess client's hair/skin type and tolerance levels
 - Test wax temperature before the wax service
 - Carry out sugaring, hot and warm strip waxing techniques on a variety of areas
 - Deal with any blood and bodily fluids safely and hygienically to eliminate infection to others
 - Establish the correct client preparation for facial treatment
 - Carry out full facial skin analysis
 - Choose products for each skin type and client's needs
 - Complete full facial treatments including the use of specialist skin care products and electrical equipment to meet the needs of the client
 - Carry out eyebrow, eyelash and advanced eyelash extension treatments to meet client's requirements
 - Apply basic and advanced make-up free hand techniques for a range of occasions including fantasy styles
 - Develop a Body Treatment plan to meet the identified needs
 - Identify the correct method of client preparation for the Body Treatment taking into consideration client comfort and modesty
 - Select, apply and remove body scrub product
 - Select, apply and remove body wrap product
 - Perform a range of massage techniques with appropriate rhythm, speed, pressure and range of movements
 - Use a range of mechanical treatments
 - Use a range of aromatherapy oils
 - Prepare area for nail treatments with appropriate products and ergonomic design
 - Carry out spa manicure and pedicure treatments using a full range of treatments and products to meet client 'needs

- Carry out treatments to include, exfoliation, cuticle, massage, mask and varnish application
- Apply a range of nail art designs
- Apply Gel Polish cured by the Blue UV curing light
- Apply artificial nail tips
- Apply a range of nail systems

Cooking

The chef in a high class hotel or restaurant offering fine dining will need to demonstrate outstanding skills in food preparation and presentation. They will be expected to create and adapt dishes that meet the expectations of demanding customers who are used to dining in exclusive restaurants.

Entrants must:-

- Know and Understand,
 - Personal Hygiene & Safety Standards
 - Work station Hygiene & Safety Standards
 - Food Safety Standards
 - Organisational Skills – workflow, planning, efficiency
 - Competition Preparation Standards and Regimen
 - Basic and Complex Culinary Skills
 - Global Ingredients
 - The Mise-en-place Preparation Processes
 - Competition Plating Standards and Regimen
 - The Service Presentation Processes
 - Mentally how to stay focussed

- Be able to,
 - Work clean and hygienic
 - Work Safely
 - Store Food Safely
 - Organise menu ingredient requirements
 - Organise workspace
 - Organise prep-list timings and co-ordination of tasks
 - Work Methodically
 - Breakdown Meat – Lamb, Chicken, Duck
 - Breakdown Fish – Seabass, Salmon, Sole
 - Breakdown Shellfish – Scallops, Calamari, Prawns
 - Work with Dark and White Chocolate
 - Prepare Sponge Products
 - Manage Wastage
 - Organise menu service requirements (dish and ingredients meet criteria)
 - Organise service timings
 - Prepare and Serve a Starter, Main and Dessert (4 portions of each)
 - Manage the Portion Size
 - Manage Clean Plate Service
 - Plate with visual appeal – colours, balance, harmony, creativity
 - Produce dishes with Taste and Texture
 - Cleandown after each process
 - Work extended hours under pressure
 - Work independently
 - Multi-task

Hairdressing

A hairdresser generally works in the commercial sector, offering a range of services and treatments to the hair for individual clients.

The hairdresser works in diverse environments and may offer a wide range of services, including cutting, colouring, styling, chemical reformation and special hair treatments.

Entrants must:-

- Know and Understand,
 - The nature of different hair types, including facial hair
 - The ethnic classifications of hair
 - The growth characteristics and patterns of hair
 - The relationship between facial shape and hair styles
 - The principles underlying the change of colour of hair
 - Options and preferred treatments as they apply to gentlemen's and ladies' hairdressing
 - The range of techniques available for temporary, semi-permanent and permanent colouring, relative to the brief, hair type, classification and condition
 - The range of techniques available for decolouring and colour correction, relative to the brief, hair type, classification and condition
 - The properties, uses and limitations of the full range of decolouring/colouring materials and products
 - The impacts of the chemicals upon each other, the hair and the body
 - The available options for applying colouring/decouring products to added hair (wefts)
 - The uses and effects of the available drying and thermal equipment
 - The uses and effects of styling products and materials, both conventional and unconventional
 - The uses and effects of the available equipment for use on dry hair
 - The ways in which added hair (wefts) and ornamentation can be used to enhance a style
 - The uses and effects of finishing products
 - The principles underlying changes to the shape of human hair
 - The range of techniques available for effecting changes to the shape of hair
 - The properties, uses and limitations of the full range of associated products and chemicals
 - The impacts of the chemicals upon each other, the hair and the body
 - The relationship between hair type, classification, length and condition and the options for chemical reformation
 - Options and preferred chemical reformation as they apply to gentlemen's and ladies' hairdressing
- Be able to,
 - Appraise the hair relative to the requested style and cutting methods, based on the hair's category, type and condition
 - Select appropriate cutting tools and cutting method on wet or dry hair.
 - Cut facial hair and beard designs ranging from a single beard to more intricate patterns
 - Execute technically demanding cuts
 - Cut hair wefts
 - Analyse the hair for its capacity to respond to the application of chemicals without adverse effects

- Recognize and acknowledge the situations where colouring/decolouring and bleaching is not an option
- Administer skin and allergy tests as required, and factor in the results
- Select and use chemicals and products to lighten, darken, add and remove colour, including for colour correction
- Take account of the available time in determining the treatments
- Determine the number and range of colours and bleaching treatments to complement each other, the style and the cut
- Apply colouring/decolouring and bleaching products through the process of selection, mixing and preparation, application, development, testing, appraisal and removal, in conformity with manufacturers' instructions
- Apply chemicals according to the length of hair, hair types, nonchemical treated hair, chemically treated hair
- Apply heat, including accelerators, according to the treatment and manufacturers' instructions
- Select and use the available drying and styling equipment
- Select and apply styling materials to support the desired effect
- Follow the intention and style of the cut throughout the drying process
- Select and add hair ornamentation as required, during or after styling, according to the type and purpose of the ornamentation
- Re-cut the hair as required achieving the desired finish and style
- Select and add hair (wefts, attachments with synthetic or natural hair) as required during or after styling, re-cutting them as required
- Apply final finishing products using industry standards on the client as required during or after styling
- Analyse the hair for its capacity to respond to the application of chemicals without adverse effects, taking account of hair length, type, condition and previous treatments
- Administer skin and allergy tests as required, and factor in the results
- Assess the feasibility of the client's wishes and offer feedback and advice
- Take account of the available time in determining the chemical reformation treatment
- Settle the client and protect the clothes, body and skin throughout the treatment
- Provide optimal conditions for the successful use of the chemical reformation products, according to the manufacturers' instructions and health and safety considerations
- Apply the chemical reformation products through the entire process of selection, mixing and preparation, application, development, testing, appraising results, removal, neutralizing or re-forming, conditioning, and preparation for styling
- Safeguard the hair from excessive finishing while settling from the effects of reformation

Restaurant Services

Restaurant service involves the service of food and beverages in fine dining restaurants, bistro's, cafes, hotels and other dining establishments. Waiting staff prepare tables for service, take orders, clear down, mix and serve drinks, open and serve wines, calculate bills and take payments. Waiters are required to provide a high standard to match the quality of the food they serve. They are the face of the business and the most important contact person attending to the customer's needs

Entrants must:-

- Know and Understand
 - Carving skills
 - Lay-up skills
 - Cocktail preparation
 - Opening of Wine and Champagne bottles
 - Hygiene practices
 - Table decoration
 - Use of all Bar equipment
 - Use of Gas burner
 - Decanter
 - Silver service gear
 - Hollowware, glass and crockery
 - Traditional globally accepted service techniques
 - H&S rules and regulations
 - First Responder abilities
 - Risk awareness
 - Risk assessment

- Be able to,
 - Perform the required service for Fine Dining,
 - Perform the required service for Banquet Dining,
 - Perform the required service for Casual Dining,
 - Perform the required service for Wine service,
 - Publically perform Fruit carving,
 - Publically perform Serviette folds
 - Publically perform Salmon Carving
 - Publically perform Salad construction
 - Flambé of various dishes, savoury and sweet

TRANSPORTATION AND LOGISTICS

Autobody Repair

Autobody repairers realign both the structure and the panelling of both light and heavy vehicles after they have been involved in collisions. This can often be a complex process as each collision will present different degrees of damage. The repaired vehicle must conform to the stringent specifications laid down by the vehicle manufacturer and meet both their tolerances and their safety specifications. An autobody repairer needs to be familiar with mechanical components and their function as well as the specific and often complex safety restraint systems (SRS) fitted to modern vehicles.

In the case of major repair the Autobody repairer will mount the vehicle onto a specialized body jig with which he or she can diagnose the extent of the misalignment to the car body structure. He or she then attaches heavy hydraulic pulling equipment to the body and uses this pulling force to reverse the damaging force.

After the misalignment has been rectified to the structure the repairer will normally have to remove damaged structural and non-structural members which are replaced with new sections or part sections using various welding processes and/or riveting and bonding. For a minor collision an Autobody repairer may replace or repair non-structural panels to a condition suitable for refinishing with paint.

Repairers must be able to use vehicle body alignment benches and associated measuring equipment (universal and fixed bracket) as a means of assessing the extent of damage and reinstating the structure to its original specifications. An autobody repairer must also be a skilled welder who is capable of joining a variety of metals such as low carbon steel, high strength steels or aluminium alloys using metal active gas welding (MAG), tungsten inert gas welding (TIG), and resistance spot welding.

For minor damage that does not require the replacement of a part or panel an autobody repairer will use a variety of repair tools to remove the damage and reinstate the panel's original contours. These may involve a range of shaped hammers and 'dollies', bumping files, body files, pry bars and oil stones.

Entrants must:-

- Know and Understand,
 - Current occupational health and safety regulations relating to the autobody repair industry
 - All recommendations and information published by the suppliers or manufacturers of products and equipment
 - The process for maintaining and using specialist equipment
 - Terminology that relates to body repair processes
 - Terminology that relates to the car body structure and its construction
 - The importance of the correct handling and disposal of environmentally harmful products
 - Manufacturers' data and how this is translated to the vehicle body
 - The principles surrounding the construction of vehicle bodies, including light passenger, light commercial and commercial
 - Characteristics of body construction relating to strength and collision protection
 - Characteristics and purpose of structural and non-structural panels
 - The importance of positional correctness to retain vehicle safety and performance
 - Methods of correcting forces including vectors of force
 - Principles of body jig measuring systems including bracket and universal systems
 - Principles of pulling systems including fixed post, swinging arm and vector systems
 - The importance of following the manufacturers recommended repair methods and warranty procedures

- Suitable methods of identifying fixing types weld positions and weld types
 - Methods of safely and cleanly removing fastenings to free damaged panels for replacement
 - Use, setting and maintenance of pneumatic tools used for panel removal and replacement
 - Principles of operation and adjustment of welding systems used for panel replacement including MAGS, TIGW, Resistance spot and MIG brazing
 - Processes and procedures for preparing replacement panel work and panel fixing positions
 - The importance of realigning structural parts and assemblies to reinstate vehicle integrity and driving characteristics
 - Principles of reinstating suitable corrosion protection to replaced parts
 - The importance of working within agreed time schedules
 - The principles underpinning the use of any of the above fastening system
 - The types, availability and varieties of the above system
 - The range of tools used to carry out remove and replace operations and their safe/correct uses
 - The range of methods for removing and replacing individual panels and parts methods used to align replaced parts and panels to reinstate manufacturers original settings
- Be able to,
 - Apply occupational health and safety regulations and best practice to the autobody repair industry
 - Use correctly and maintain personal protective clothing and equipment
 - Set-up, use, adjust and maintain all specialist repair equipment
 - Promote health and safety practices in the workplace
 - Apply all recommendations and guidance provided by suppliers and manufacturers of equipment or products
 - Adhere to MSDS (Manufacturers Safety Data Sheets)
 - Adopt correct procedures for handling and disposing of environmentally harmful products
 - Select and use products that are environmentally acceptable
 - Dispose of environmentally harmful products in a safe and responsible way
 - Mount the vehicle on anchoring equipment
 - Interpret manufacturers specifications relating to the vehicle
 - Diagnose the extent of vehicle damage and rectify this damage with reference to the vehicle manufacturers recommendations
 - Determine the direction of the damaging force or impact
 - Determine the extent of the damaging force or impact
 - Determine structural damage using appropriate diagnostic equipment
 - Identify the correct and appropriate methods for the correction of vehicle body damage
 - Reinstated correct vehicle body alignment
 - ‘Rough out’ damaged sections or panels prior to removal for replacement
 - Straighten and align damaged structural components and reinstate their dimensional accuracy
 - Diagnose frame damage using any of:
 - Toe in gauge
 - Self-alignment gauge
 - Tram gauge
 - Vehicle manuals etc.

- Repair and align full frame and suspension damage
- Repair or replace structural parts correctly
- Remove structural panels with minimal disturbance to surrounding panels and prepare surfaces appropriately to receive new parts
- Prepare replacement parts to ensure correct fit up and alignment
- Remove welded panels correctly (rails, rear quarter panels, pillars, structural body panels etc.
- Replace major welded panels or panel assemblies at manufacturers' seam positions
- Carry out structural part replacement using sectioning methods and procedures
- Use correct welding procedure when replacing structural parts taking into consideration materials being joined, identity of the parts and unforeseen hazards such as brake, fuel and electrical lines
- Replace structural panels using any of the following jointing methods:
 - Welding
 - MIG brazing
 - Riveting and bonding
- Carry out welding procedures necessary to complete the repair (MAGS, TAGS, Resistance spot, MIG Brazing
- Dress weld seams using sanding/grinding operations
- Remove and re-install or attach parts and/or body panels (hoods, fenders, doors etc.)
- Re-align replaced parts to manufacturers' given tolerances where available for panel alignment and/or torque settings
- Remove, replace and adjust exterior/interior trim and/or other parts necessary to complete the repair

Automobile Technology

The trained and competent Light Vehicle Automobile Technician will service and repair a range of light vehicles. For diagnosis, repair and replacement, depending on the nature of the workshop, they may use the manufacturers' equipment, parts, materials and procedures. Therefore, according to a workshop's relationship with manufacturers, the Technician's experience must ensure correct fault finding and repair.

Entrants must:-

- Know and Understand,
 - The technical language associated with the skill
 - The standards required for routine and exception reporting in oral, written and electronic form
 - The nature of the reports provided by measuring equipment and their interpretation
 - Spark ignition engine management systems
 - Compression ignition engine management systems
 - Electronic fuel injection systems
 - Forced induction, emission and exhaust systems
 - Body electrical and electronic systems
 - Braking and stability control systems
 - Suspension and steering systems
 - Drive line systems
 - The correct use and interpretation of relevant measuring devices and equipment
 - The principles and applications of all relevant numerical and mathematical calculations
 - The principles and applications of advanced diagnostic procedures
 - The principles and applications of specialist diagnostic tooling and equipment
 - The options for repair or replacement
 - Repair methods/procedures, special tool requirements

- Be able to,
 - Read, interpret and extract technical data and instructions from workshop manuals in any available format
 - Communicate in the workplace by written and electronic means, using standard formats
 - Complete reports and respond to issues and questions arising
 - Interpret customer requirements and manage customer expectations positively
 - Use test equipment to measure, check and diagnose management systems for mechanical and/or electronic faults;
 - Perform tests to identify and isolate a fault.
 - Calibrate and use all measuring devices and equipment (mechanical and electrical) for diagnosis
 - Select and apply the appropriate devices and equipment to make inspections and diagnose deficiencies and faults to:
 - Spark ignition systems
 - Compression ignition systems
 - Forced induction, emission and exhaust systems
 - Body electrical/electronic systems
 - Braking and stability control systems
 - Suspension and steering systems
 - Drive line systems

- Use manufacturers' and component suppliers' specification as required
- Use correct procedures for securing replacement parts
- Repair vehicle electrical systems and electrical circuits
- Dismantle, assess and assemble hydraulic braking systems (disc and drum) or associated components, including hand or parking brake
- Dismantle, assess and assemble driveline components
- Dismantle, assess and assemble steering systems and components
- Dismantle, assess and assemble suspension systems and components
- Carry out steering wheel alignment operations
- Dismantle, assess and assemble four stroke engines and engine components
- Dismantle, assess and assemble manual transmissions and components

Car Painting

Car painters are responsible for reinstating the pre-accident paint finish to cars after the structure and/or the panels have been repaired or replaced. They may also be asked to completely repaint a whole vehicle either to change its colour or reinstate its newness. Car painters may also become involved in matching colours to an original colour no longer available or to colours that prove difficult to match. A car painter must match the colour, shade and texture of the adjoining panels that are not being painted.

Car painters prepare panels or vehicles to receive paint. They may carry out minor panel repairs and apply undercoats, colour coats and clear sealant coats which provide the high gloss levels required. They may be required to identify a colour code using various methods, mix the correct amount of colour to pre-determined formulae and spray test cards to test the suitability of this colour match to the original colour and shade.

Entrants must:-

- Know and Understand,
 - The range, purpose and application of products used in the car painting industry for the following procedures:
 - Cleaning
 - Removal of contaminants
 - Repairing minor panel and paint damage
 - Sanding or levelling and final cleaning
 - Removal of surface contaminants
 - Removal of dust from all areas to be finished
 - Protection of parts and areas not being painted
 - Range of adhesion promoters and primers available
 - Purpose of adhesion promoters and primers
 - The context of where and when various adhesion promoters and primers are used
 - Mixing and application techniques for each of the adhesion promoters and primers
 - The drying characteristics of each adhesion promoter or primer
 - The preparation and application process for the full range of seam sealers, e.g. gap sealers, weld sealers, seam sealers etc.
 - Which sealer materials to select for a particular application
 - The drying characteristics of each adhesion promoter or primer
 - How to access information related to colour and application
 - Types and specifications of car paints and their uses
 - Warranty procedures applied to particular vehicles
 - The correct use of equipment used in applying base coats and ground coats
 - Special effects paint finishes
 - The impact upon cost and environment of over mixing materials
 - The purpose of a clear coat
 - The process for identifying, mixing and applying clear coats
 - The importance of following manufacturer's instructions
 - The need for flexible additives as required
 - The spray gun set up and adjustment for clear coat materials
 - The correct gun pressure, speed, distance and overlap required to produce an excellent finish with clear coats and achieve high gloss levels
 - Colour technology and colour adjustment techniques (Munsell Colour Wheel)
 - Technical terms and definitions for colour descriptions
 - The effects of colour miss-match in terms of face and flop tone
 - The effects of varying strengths and values of toners
 - The impact of light quality and type on colour

- The impact of spraying techniques upon colour match
 - Basic geometry
 - Appropriate materials for masking different areas
 - Uses of different types of masking materials
 - How to selection and use of specialist measuring and marking out equipment e.g. beam compass, rules, straight edges etc.
 - Techniques for applying decals/transfers
 - The use and maintenance of air brushes and mini spray guns
 - The correct procedure to rectify minor paint damage or defects
 - The procedures and materials required to rectify minor panel damage
 - Techniques and materials for removal and repair of minor paint defects and damage
 - Spot repair or blend-in techniques to keep paint repairs to confined areas
 - Techniques to invisibly spot repair or blend paint in confined areas
- Be able to,
 - Use appropriate cleaning products to remove contaminants
 - Prepare surfaces to be coated with the appropriate abrasive products
 - Carry out minor panel repairs
 - Carry out final cleaning of the surface prior to paint application
 - Remove dust from all areas to be refinished
 - Suitably remove other contaminates such as glues, labels and sealers
 - Carry out proper masking procedures to protect surrounding areas
 - Apply suitable primers and or fillers to the substrate and appropriate for the process being used:
 - Etch primers
 - Primer surfaces
 - Primer fillers
 - Plastic primers
 - Apply the correct procedures for sanding (flattening) primer fillers
 - Reinstatement of the corrosion protection of the panels being painted
 - Apply seam sealers
 - Measure out materials carefully to minimize environmental effects and cost implications
 - Retrieve colour and application information from printed and electronic sources
 - Use appropriate equipment and technology to access colour formulations (computer based and/or photo spectrometer)
 - Use colour swatches/chips to identify the correct colour and shade and variant
 - Apply the electronic information to mix required colour and shade
 - Follow the correct procedure to spray out a test paint card and compare with the original standard, adjust as necessary
 - Mix and apply straight/solid colours, metallic, pearls, 3-stage pearls and special effect colours
 - Apply base/ground coats to metal and non-metal parts
 - Follow the original engineering manufacturer (OEM) or paint manufacturer's (Technical Data Sheet – TDS) recommendations
 - Measure materials to minimize the environmental and cost factors
 - Identify, mix and apply clear coats correctly
 - Adjust spray gun to achieve the correct outlet pressure, fan width and fan shape.
 - Apply clear coats to achieve gloss and structure to match existing finishes
 - Apply clear coats as per paint manufacturer's instructions to avoid defects such as runs, excessive orange peel etc.

- Dispose of unused clear coat in an environmentally safe manor
- Locate and document vehicle manufacturer's paint code
- Determine type and colour of paint using the manufacturer's paint code and vehicle information
- Evaluate spray-out card against the standard to identify colour mismatch in terms of hue, chroma, saturation, lightness and darkness
- Select and apply suitable procedures to adjust colour to match the given standard
- Select toners to correct colour miss-match
- Identify and use the correct lighting to match colour use the correct gun speed, distance and overlap to produce quality spray out cards
- Interpret dimensions and shapes from a given drawing
- Use the correct tools and techniques to transfer and layout the drawing information/specification to the appropriate panels
- Measure accurately to ensure that the design meets the exact specifications
- Draw arcs and circles using drafting tools such as a beam compass
- Mask areas of the vehicle panels for the prevention of overspray between colours for design painting
- Mask and protect adjacent panels that will not be refinished
- Perfectly apply vinyl decals/transfers to a given location without creases, bubbles, cuts etc.
- Mask door jambs and other aperture panels
- Mask for design painting
- Apply freehand design work using an air brush
- Apply a range of decorative special effects including blended colours
- Identify the types of defects that may occur on a painted surface such as nibs, pin holes, runs, environmental effects etc.
- Apply the correct procedures to remove or repair paint defects
- Carry out 'smart' repairs to small areas of damage
- Evaluate the extend of minor panel damage and plan work accordingly to rectify this damage
- Wet and dry sand clear coat to remove and rectify defects
- Apply polyester and epoxy fillers and stoppers to repair small stone chip damage to panel surfaces
- Prepare and blend invisibly scratch and scuff damage
- Reinststate the original gloss levels using polishing techniques and materials