



Technical Education
and Skills Development Authority

Webliography

The Webliography is an electronic bibliographic listing of topics related to the qualification titles of a particular TVET priority sector, with pre-searched *URLs* (uniform resource locators) and descriptions (abstracts).

The pre-searched *URLs* provide contents in reference to the title of promulgated Training Regulations (TR). By clicking the weblinks (underlined *URLs* in blue text), your internet browser will direct you to the website/webpage where you can find the topic related to the title you selected. The Webliography is a useful tool for trainers who are designing and developing competency-based curriculum and learning materials.

[TESDA](#) » [Webliography](#) » [Electrical and Electronics Sector](#)

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Electrical and Electronics Sector

Scope:

Electronics technology deals with the emission and effects of electrons and the operation of electronic devices usually powered by small amounts of electricity. It is actually the science on how to control electric energy in which electrons have a fundamental role. Electronics deals with electrical circuits that involve active electrical components such as vacuum tubes, transistors, diodes and integrated circuits, and associated passive electrical components and interconnection technologies.

Source:

<http://en.wikipedia.org/wiki/Electronics>

List of qualifications:

- Computer Systems Servicing NC II
- Consumer Electronics Servicing NC II, III and IV
- Electrical Installation and Maintenance NC II, III and IV
- Electronic Products Assembly and Servicing NC II
- Electronics Back-End Operation NC II
- Electronics Front-of-line Operation NC II
- Instrumentation and Control Servicing NC II, III and IV
- Mechatronics Servicing NC II, III and IV
- Semiconductor Back-End Operation NC II
- Semiconductor Front-of-line Operation NC II

❖ Definition of electronics

<http://www.thefreedictionary.com/electronics>

This webpage provides definition and meaning of technical terms including translations.

[Updated February 11, 2019]

❖ Electronics engineer job description

http://www.prospects.ac.uk/electronics_engineer_job_description.htm

This webpage provides description on the job of an electronics engineer including typical work activities, job duties, etc.

[Updated February 11, 2019]

❖ Job description of an electronics technician

<https://dot-job-descriptions.careerplanner.com/ELECTRONICS-TECHNICIAN.cfm>

This webpage provides the job description of an electronics technician.

[Updated February 11, 2019]

❖ The Philippine electronics industry

<http://siteresources.worldbank.org/INTPHILIPPINES/Resources/ErnestoSantiago.pdf>

This webpage presents the status of electronics in the Philippines.

[Updated February 11, 2019]

❖ Electronics jobs in the Philippines

<http://job-search.jobstreet.com.ph/philippines/browse/electronics-communication-engineering-jobs/>

This webpage provides a list of job providers, job opportunities, contact information and other related information.

[Updated February 11, 2019]

❖ LG career

<http://www.lg.com/ph/career>

This website provides suggestions for choosing a career in LG electronics.

[Updated February 11, 2019]

❖ Philips career

<http://www.philips.com.ph/a-w/careers/homepage.html>

This webpage provides a list of job opportunities in electronics functional areas i.e. engineering, design, quality, intellectual property, sales, finance, HR, marketing, legal, supply chain, research and procurement.

[Updated February 11, 2019]

❖ SGS training services

<http://www.sgs.ph/en/Training-Services/Industry-Based-Training/Consumer-Goods-and-Retail/Electrical-and-Electronics.aspx>

This webpage provides a list of career training in electronics and other industries. Training experts can help incorporate critical compliance requirements from the design stage to the end of the production life cycle.

[Updated February 11, 2019]

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Computer Systems Servicing NC II

This Qualification consists of competencies that must possess to enable to install and configure computers systems, set-up computer networks and servers and to maintain and repair computer systems and networks.

Core Competencies

- Install and configure computer systems
- Set-up Computer Networks
- Set-up Computer Servers
- Maintain and Repair Computer Systems and Networks

❖ Computer maintenance definition

http://en.wikipedia.org/wiki/Computer_maintenance

This webpage defines computer maintenance as the practice of keeping computers in a good state of repair.

[Updated February 11, 2019]

❖ How to Configure a Computer to Multi Boot Operating Systems

<https://www.wikihow.com/Configure-a-Computer-to-Multi-Boot-Operating-Systems>

This webpage provides instructions with illustrations on configuring a computer utilizing multiple operating systems.

[Updated February 11, 2019]

❖ How to Setup a Computer Network

<https://www.lifewire.com/how-to-set-up-a-network-4097198>

This webpage provides information on setting up computer networks at home using broadband routers.

[Updated February 11, 2019]

❖ How to Setup your first server

<https://www.techradar.com/news/computing/servers/how-to-set-up-your-first-server-1166915>

This webpage provides information on installing windows server using Windows Server 2012.

[Updated February 11, 2019]

❖ How to Install Windows Server 2008 R2

<https://www.howtogeek.com/50036/how-to-install-windows-server-2008-r2/>

This webpage provides a guide in installing Windows server 2008 R2 with illustrations and step-by-step instructions.

[Updated February 11, 2019]

❖ Simple Ways to Maintain Your Computer

<https://www.lifewire.com/maintain-computer-4097220>

This webpage provides tips on maintaining computers, software and files.

[Updated February 11, 2019]

Consumer Electronics NC II

Core Competencies

- Assemble/ disassemble consumer electronic products and systems
- Maintain and repair audio/ video products and systems
- Maintain and repair electronically-controlled domestic appliances
- Maintain and repair cellular phones

❖ Consumer electronics definition

http://en.wikipedia.org/wiki/Consumer_electronics

This webpage provides descriptions of consumer electronics as electronic equipment intended for everyday use, most often in entertainment, communications and office productivity. In British English they are often called brown goods by producers and sellers

[Updated February 11, 2019]

❖ Consumer electronics

<https://www.euromonitor.com/consumer-electronics-in-the-philippines/report>

This webpage provides information about the condition of consumer electronics industry in the Philippines. This includes data in on trends and market projections about the viability of consumer products of various manufacturers.

[Updated February 12, 2019]

❖ How to Change Appliance Cords

<https://www.dummies.com/home-garden/home-improvement/electrical-wiring/how-to-change-appliance-cords-and-plugs/>

This webpage provides a guide in replacing electric cords safely

[Updated February 12, 2019]

❖ TV Repairs

<https://www.currys.co.uk/gbuk/tv-repairs-problems-371-commercial.html>

This webpage provides information on repairing digital televisions whether it's LED, LCD or Plasma.

Consumer Electronics NC III

This Qualification consists of competencies that a person must possess to commission consumer electronic products and systems, train service technician and develop servicing system for consumer electronic products and systems.

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Core Competencies

- Commission consumer electronic products and systems
- Develop servicing systems for consumer electronic products and systems
- Train Service Technicians

Consumer Electronics NC IV

This Qualification consists of competencies that must possess to enable a person to manage servicing system for consumer electronic products and systems and to train service technician supervisor.

Core Competencies

- Manage servicing systems for consumer electronics products and systems
- Train Service Technician Supervisors

[Updated February 12, 2019]

❖ Troubleshooting a Failed Speaker Channel

<https://www.lifewire.com/troubleshoot-speaker-channel-3135138>

This webpage provides a guide in troubleshooting speaker channel issues with links to other related topics.

[Updated February 12, 2019]

❖ How to Repair Small Appliances

<https://home.howstuffworks.com/how-to-repair-small-appliances.htm>

This webpage provides tips in troubleshooting any domestic appliance from heating, motor, plugs, wires and connectors.

[Updated February 12, 2019]

❖ How to Fix a Cellular Phone

<https://www.wikihow.com/Fix-a-Cell-Phone>

This webpage provides tips in repairing cellular phones with minor defects.

[Updated February 12, 2019]

❖ Electronics Tutorials

<https://www.electronics-tutorials.ws/>

This webpage provides the theories and principles in electronics.

[Updated February 12, 2019]

❖ Hardware and Embedded Design Services

<https://www.happiestminds.com/services/embedded-design-services/>

This webpage provides information on the various support services in electronics i.e. industrial/ mechanical design, thermal engineering along with regulatory certifications.

[Updated February 12, 2019]

❖ Certified Electronics Technician Education and Training Requirements

https://study.com/certified_electronic_tech.html

This webpage provides the requirements for certified electronics technicians to be able to repair a variety of electronics equipment.

[Updated February 12, 2019]

Electrical installation and maintenance NC II

This qualification consists of competencies that a person must achieve to enable him/her to install and maintain electrical wiring, lighting and related equipment and systems where the voltage does not exceed 600 volts in residential houses/buildings.

Core Competencies

- Perform roughing-in activities, wiring and cabling works for single-phase distribution, power, lighting and auxiliary systems
- Install electrical protective devices for distribution, power, lighting, auxiliary, lightning protection and grounding systems
- Install wiring devices of floor and wall mounted outlets,

❖ What is Electrical Maintenance?

<https://www.wisegeek.com/what-is-electrical-maintenance.htm>

This webpage provides information about electrical maintenance, its definition, and scope of work and description of activities.

[Updated February 12, 2019]

❖ The 16 Tools You Need for Electrical Projects

<https://www.thespruce.com/top-electrical-tools-1152575>

This webpage provides the list of tools required for basic electrical jobs.

[Updated February 12, 2019]

❖ What is Electrical Rough-In?

<http://www.acmehowto.com/electrical/remodel/rough-in.php>

This webpage explains the importance and methods of performing roughing -in activities.

[Updated February 12, 2019]

❖ Do it yourself - How to wire a GFCI electrical outlet

https://wireityourself.com/gfci_electrical_outlet.html

This webpage provides information on performing wiring activities using ground fault current interrupting outlets.

[Updated February 12, 2019]

❖ How to Install a New Electrical Lighting Outlet on the Ceiling

<https://homeguides.sfgate.com/install-new-electrical-lighting-outlet-ceiling-68301.html>

This webpage provides a guide on the installation of electrical lighting outlet in the ceiling to connect any lighting fixture, with links to related

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lighting fixtures/switches, and auxiliary outlets

Electrical installation and maintenance NC III

This qualification consists of a set of competencies that a candidate for this qualification must achieve in order to obtain a national certificate for this qualification as specified by TESDA requirements. This particular set of competencies excludes core technical competencies required for related highly specialized vocational skilled workers such as linemen, substation technicians, electrical motors/generators repair technicians, etc..

Core Competencies

- Perform roughing-in and wiring activities for three-phase distribution system for power, lighting and motor control panel.
- Perform installation of data measurement and control system on electrical and auxiliary equipment
- Install, assemble, test and maintain motor control system

Electrical installation and maintenance NC IV

This qualification consists of a set of competencies that a candidate must achieve in order to obtain a national certificate for this qualification as specified by TESDA requirements. This particular set of competencies excludes core technical competencies required for related highly specialized vocational skilled workers such as linemen, substation technicians; electrical motors/generators repair technicians, etc.

Core Competencies

- Prepare Electric and hydraulic tools.
- Perform roughing-in and wiring for activities for bus and underfloor ducts.
- Perform installation of wiring devices for floor and ground fault current interrupting

topics.

[Updated February 13, 2019]

❖ 27 Must-Know Tips for Wiring Switches and Outlets Yourself

<https://www.familyhandyman.com/electrical/wiring/wiring-switches-and-outlets/view-all/>

This webpage provides a guide in connecting wires for switches and convenience outlets at home.

[Updated February 13, 2019]

❖ How to Install Outdoor Lighting and Outlet

<https://www.familyhandyman.com/electrical/outdoor-lighting/how-to-install-outdoor-lighting-and-outlet/view-all/>

This webpage provides the steps in installing electrical lighting and outlets for outdoor use.

[Updated February 13, 2019]

❖ Datacomm office wiring: recommended procedures

<http://ecmweb.com/content/datacom-office-wiring-recommended-procedures>

This webpage describes the EIA/TIA standards for wiring the office.

[Updated February 13, 2019]

❖ Fire Alarm System Facts

<http://ecmweb.com/code-basics/fire-alarm-system-facts>

This webpage advertises Article 760 that explains how to install wiring and equipment for fire alarm systems.

[Updated February 13, 2019]

❖ What is Electrical Maintenance?

<http://www.wisegeek.org/what-is-electrical-maintenance.htm>

This webpage explains how electrical maintenance is required with illustrations.

[Updated February 13, 2019]

❖ Ten Tips on understanding the National Electrical Code

<http://www.codebookcity.com/codearticles/nec/10codetips.htm>

This webpage is intended for engineers, construction workers and refers the standard codes and techniques on electrical works.

[Updated February 13, 2019]

❖ Building Wire and Cable

<http://www.nema.org/products/Pages/Building-Wire-and-Cable.aspx>

This webpage introduces the products of NEMA for electrical wires and cables.

[Updated February 13, 2019]

❖ Flexible Cords, Cables and Fixture Wire

<http://ecmweb.com/code-basics/flexible-cords-cables-and-fixture-wire>

This webpage provides the wiring requirements of article 400, including guidelines for flexible cords, cables and fixtures.

[Updated February 13, 2019]

❖ Wiring a building switchboard from an outdoor transformer

<http://ecmweb.com/content/wiring-building-switchboard-outdoor-transformer>

This webpage explains the rules when installing outdoor transformers."

[Updated February 13, 2019]

❖ Lighting controls

<http://www.facilitiesnet.com/lighting/article/With-Lighting-Controls-Facility-Managers-Should-Understand-Products-Buildings-Wiring--13122>

This webpage explains the importance of carefully selecting lighting control products.

[Updated February 13, 2019]

❖ Principles of Grounding of Lighting Protection Systems

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outlets.

- Perform installation of standard electrical protection system for lightning and grounding.
- Perform installation of electrical lighting systems, auxiliary outlets and lighting fixtures.
- Perform installation of data measurement and control system on electrical and auxiliary equipment.
- Assemble and install electrical lighting and motor control systems.
- Perform maintenance and troubleshooting works.
- Supervise/Monitor installation and maintenance on electrical systems, auxiliary including control, lighting, power and protection equipment.
- Perform commissioning of electrical equipment/system.
- Perform programming and installation of basic PLC systems

http://www.lightningsafety.com/nlsi_lhm/grounding_principles_NFP_A780.html

This webpage contains explanations on electrical protection system for lightning and grounding
[Updated February 13, 2019]

❖ How to Read Electrical Plans

<https://www.northernarchitecture.us/construction-drawings/o-o-o.html>

This webpage provides information on reading electrical plans.
[Updated February 13, 2019]

❖ Tools, equipment and PPE needed to install electrical wiring

http://www.licensedelectrician.com/Store/Electrician_Tools.htm

This webpage explains the different tools, equipment and PPEs used for installing electrical wiring devices.
[Updated February 13, 2019]

❖ Estimating Electrical bill of materials as per Plan

http://photos.state.gov/libraries/iraq/5/contracting/statement_work.pdf

This webpage provides details on estimating bill of materials for electrical projects.
[Updated February 13, 2019]

❖ Voltage, Current, Resistance and Ohm's Law

<https://learn.sparkfun.com/tutorials/voltage-current-resistance-and-ohms-law/all.pdf>

This webpage prides explanations on electrical charge that relates to voltage, current, and resistance.
[Updated February 13, 2019]

❖ Voltage, Current, Resistance, and Ohm's Law

<https://learn.sparkfun.com/tutorials/voltage-current-resistance-and-ohms-law>

This tutorial will give you the basic understanding of voltage, current, and resistance and how the three relate to each other.
[Updated February 13, 2019]

❖ English and Metric System and Conversion

<http://mathbitsnotebook.com/Algebra1/Units/UNMetricEnglish.html>

This webpage provides information about the *metric system*; and types of measurement (size, weight, capacity), represented by (meter, gram, and liter). A conversion from English to metric system is explained.
[Updated February 13, 2019]

❖ Safety procedures in installing electrical protection system as per PEC and Industry standards

<http://www.slideshare.net/Jerick54/philippine-electrical-code>

This webpage provides a slide presentation of the Philippine Electrical Code that can be downloaded.
[Updated February 13, 2019]

❖ Minimizing risks

http://w3.siemens.com/powerdistribution/global/en/lv/news_installation-technology_installationstechnik/customer-magazines/e-installation/installation-technology/pages/protection-measures-electrical-systems.aspx

This webpage provides a magazine that explains the many sources of electrical hazards from fault currents to overcurrent to overvoltage in the power grid and a comprehensive protection system with interconnecting safety components provides the best safeguard for people and equipment.
[Updated February 13, 2019]

❖ What is Waste Management

<http://www.conserve-energy-future.com/waste-management-and-waste->

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[disposal-methods.php](#)

This webpage provides a definition of waste management and gives various types and methods of waste disposal including electrical and electronic products.”

[Updated February 13, 2019]

❖ **Recycling Electrical Items**

<https://www.electricalsafetyfirst.org.uk/guidance/safety-around-the-home/recycling-electrical-items/>

This webpage provides an advice on recycling electrical goods and the reasons for recycling.

[Updated February 15, 2019]

❖ **5S on Good Housekeeping**

<http://www.slideshare.net/moralescapri/5s-the-practice-of-good-housekeeping-39501798>

This webpage provides shows a downloadable slide presentation describing and explaining in detail what 5S is in the text transcript.

[Updated February 15, 2019]

❖ **Motor Controller Definition**

https://en.wikipedia.org/wiki/Motor_controller

This webpage defines electric motor controller as a device or group of devices that serves to govern in some predetermined manner the performance of an electric motor.

[Updated February 15, 2019]

❖ **Fundamentals of Motor Control**

https://download.schneider-electric.com/files?p_enDocType=Brochure&p_File_Name=0140BR9102.pdf&p_Doc_Ref=0140BR9102

This webpage provides a downloadable 60-page document on the fundamentals of motor control-basic principles and language of AC motor control.

[Updated February 15, 2019]

❖ **Electrical Control Wiring**

<https://www.youtube.com/watch?v=eHd9EUuMzIU>

This YouTube video shows the procedures in testing and checking electrical control wiring.

[Updated February 15, 2019]

❖ **Three Phase Motor Power and Control Wiring Diagrams**

<http://www.electricaltechnology.org/2014/06/three-phase-motor-power-control-wiring-diagrams.html>

This webpage shows and explains the different three phase motor connections and different wiring diagrams for motor control systems.

[Updated February 15, 2019]

❖ **Electrical Safety at Work**

<http://www.hse.gov.uk/electricity/nearelectric.htm>

This webpage emphasizes safety precautions involved in performing electrical installations and maintenance works.

[Updated February 15, 2019]

❖ **How to Write a Technical Report**

<http://www.sussex.ac.uk/ei/internal/forstudents/engineeringdesign/studyguides/techreportwriting>

This webpage provides a guide in writing a complete technical report.

[Updated February 15, 2019]

❖ **Standard Electrical Symbols for Schematic Diagrams**

<https://www.edrawsoft.com/electrical-symbols.php>

This webpage shows the standard electrical symbols that are used in drawing and reading electrical schematic diagrams.

[Updated February 15, 2019]

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<p>Control Panel Building</p> <p>https://www.youtube.com/watch?v=3zOln5hNsQ0 This YouTube video shows an example of how to assemble an electrical control panel. [Updated February 15, 2019]</p> <p>Waste Management</p> <p>https://en.wikipedia.org/wiki/Waste_management This webpage defines the principles of waste management. [Updated February 15, 2019]</p> <p>ICC Mark</p> <p>http://www.bps.dti.gov.ph/index.php?option=com_content&view=article&id=300:ps-or-icc-mark&catid=72:notice-and-announcements This webpage pertains about the quality of the product and how to spot fake ICC sticker. [Updated February 15, 2019]</p>	<p>❖ Control Panel Building https://www.youtube.com/watch?v=3zOln5hNsQ0 This YouTube video shows an example of how to assemble an electrical control panel. [Updated February 15, 2019]</p> <p>❖ Waste Management https://en.wikipedia.org/wiki/Waste_management This webpage defines the principles of waste management. [Updated February 15, 2019]</p> <p>❖ ICC Mark http://www.bps.dti.gov.ph/index.php?option=com_content&view=article&id=300:ps-or-icc-mark&catid=72:notice-and-announcements This webpage pertains about the quality of the product and how to spot fake ICC sticker. [Updated February 15, 2019]</p>
<p>Electronic Products Assembly and Servicing NC II</p> <p>This Qualification consists of competencies that a person must possess to assemble electronic products prepare printed circuit boards (PCB) modules and to install and service consumer and industrial electronic products and systems.</p> <p>Core Competencies</p> <ul style="list-style-type: none"> • Assemble Electronic Products • Service consumer electronic products and systems • Service industrial electronic modules, products and systems 	<p>❖ Printed circuit boards: The benefits of machine-assembly vs. hand-assembly https://www.electronicproducts.com/Manufacturing/IC_and_Board_Assembly/Printed_circuit_boards_The_benefits_of_machine-assembly_vs_hand-assembly.aspx This webpage provides information on the history and assembly of printed circuit boards (PCBs) for electronic components and assemblies. [Retrieved January 6, 2019]</p> <p>❖ Troubleshooting and Repair of Consumer Electronic Equipment https://www.repairfaq.org/sam/tshoot.htm This webpage provides a manual of information on the repair of electronic components and assemblies. [Retrieved January 6, 2019]</p> <p>❖ Industrial Electronics Repair http://www.yorkrepair.com/industrial-electronics-repair This webpage provides information and instructions on repairing industrial electronic products and assemblies. [Retrieved January 6, 2019]</p>
<p>Electronics Back-End Operation NC II</p> <p>This qualification consists of competencies that must be possessed to enable a person to work in an electronics company engaged in production of electronics back-end products. This qualification involves such competencies to set up backend operations workplace, analyze, carry-out and monitor back-end operations and check quality compliance of back-end operations for electronics production line.</p> <p>Core Competencies</p> <ul style="list-style-type: none"> • Set up back-end operations workplace for electronics production line • Analyze, carry-out and monitor back-end operations for electronics production line • Check quality compliance of 	<p>❖ A Guide to Manufacturing Production https://www.thebalancesmb.com/manufacturing-process-2221376 This webpage provides information on setting up a production line for small scale business. It describes the requirements and methods to customize the production line. [Retrieved January 6, 2019]</p> <p>❖ Electronic Product Manufacturing https://www.startupbizhub.com/electronic-product-manufacturing.htm This webpage provides information on setting up a production line for business. It also includes links to related topics. [Retrieved January 6, 2019]</p> <p>❖ What makes a good production plan? https://www.bdc.ca/en/articles-tools/operations/operational-efficiency/pages/production-plan-top-tips-improving-operations.aspx This webpage provides information and strategies to maximize productivity of a production line company. [Retrieved January 6, 2019]</p> <p>❖ Product regulatory compliance in electronics https://www.ibm.com/blogs/insights-on-business/electronics/product-regulatory-compliance-in-electronics/ This webpage provides information on electronic product regulatory compliance to product designers and manufacturers standards. [Retrieved June 6, 2019]</p>

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<p>back-end operations for electronics production line</p>	<p>❖ Conformance testing https://en.wikipedia.org/wiki/Conformance_testing This webpage provides a definition of conformance testing as an element of conformity assessment, and also known as compliance testing, or type testing -- is testing or other activities that determine whether a process, product, or service complies with the requirements of a specification, technical standard, contract, or regulation. [Retrieved June 6, 2019]</p>
<p>Electronics Front-of-line Operation NC II</p> <p>This Qualification consists of competencies that must be possessed to enable a person to work in an electronics company engaged in production of electronics front-of-line products. This qualification involves such competencies to set up FOL operations workplace, analyze, carry-out and monitor FOL operations and check quality compliance of FOL operations for electronics production line.</p> <p>Core Competencies</p> <ul style="list-style-type: none"> • Set up front-of-line (FOL) operations workplace for electronics production line • Analyze, carry-out and monitor front-of-line (FOL) operations for electronics production line • Check quality compliance of front-of-line (FOL) operations for electronics production line 	<p>❖ How to Set Up a Lean Factory That Works, Part I https://www.industryweek.com/continuous-improvement/how-set-lean-factory-works-part-1 This webpage provides information on setting up a lean-oriented production layout for seamless flow of people, material and information. [Retrieved January 6, 2019]</p> <p>❖ Seven Common KPIs for Production Monitoring http://www.redlion.net/resources/white-papers/seven-common-kpis-production-monitoring This webpage provides strategic philosophers or practices in manufacturing using Kaisen, Six Sigma, Total Quality Management and Continuous Improvement. [Retrieved January 6, 2019]</p> <p>❖ Product Inspection Monitoring https://www.qima.com/quality-control-services/product-and-manufacturing-inspections This webpage provides strategies in inspecting various stages of the manufacturing process to help secure production and safeguard quality of products. [Retrieved January 6, 2019]</p> <p>❖ Electronic Operations and Maintenance Manual (EOM) https://www.carollo.com/sites/default/files/tech-bulletins/ElectronicOperationsAndMaintenanceManual.pdf This webpage provides a downloadable PDF document in the form of manual describes the role of EOM in shaping the development of electronics industry through the staff that effectively operate, maintain and manage day-to-day operations. [Retrieved January 6, 2019]</p>
<p>Electronics-Semicon Operation NC II</p> <p>This qualification consists of competencies that must be possessed to enable a person to perform machine setup/conversion, monitor machine performance, perform machine troubleshooting and repair and to perform preventive maintenance and calibration.</p> <p>Core Competencies</p> <ul style="list-style-type: none"> • Perform Machine Setup/Conversion • Monitor Machine Performance • Perform Machine Troubleshooting and Repair • Perform Machine Preventive Maintenance and Calibration 	<p>❖ Semiconductor Basics https://www.electronics-tutorials.ws/diode/diode_1.html This webpage provides information on the basics of semiconductor devices which are described as the most basic passive component in electrical or electronic circuits. [Retrieved January 6, 2019]</p> <p>❖ Semiconductor Devices and Circuits, Applications https://www.elprocus.com/semiconductor-devices-types-and-applications/ This webpage provides information on semiconductor devices that have wide applications because of their reliability, compactness, and low cost. These are discrete components which are used in power devices, compactness optical sensors, and light emitters, including solid state lasers. [Retrieved January 6, 2019]</p> <p>❖ Semiconductor device fabrication https://en.wikipedia.org/wiki/Semiconductor_device_fabrication This webpage provides a definition of semiconductor device fabrication as the process used to create the integrated circuits that are present in everyday electrical and electronic devices. [Retrieved January 6, 2019]</p> <p>❖ Semiconductor Manufacturing Equipment</p>

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<p>HDD Front-of-line Operations NC II</p> <p>This Qualification consists of competencies that must be possessed to work in an electronics company engaged in production of hard disk drive front-of-line products. This qualification involves such competencies to enable a person to set up FOL operations workplace, analyze, carry-out and monitor FOL operations and check quality compliance of FOL operations for HDD production line.</p> <p>Core Competencies</p> <ul style="list-style-type: none"> • Set up front-of-line (FOL) operation workplace for hard disk drives (HDD) production line • Analyze, carry-out and monitor front-of-line (FOL) operation for hard disk drives (HDD) production line • Check quality compliance of front-of-line (FOL) operation for hard disk drives (HDD) production line 	<p>https://www.hitachi-hightech.com/global/products/device/ This webpage provides a description of Hitachi's semiconductor manufacturing processes and procedures. [Retrieved January 6, 2019]</p> <p>❖ Production Machine & Performance Monitoring White Papers and Articles https://www.automation.com/library/articles-white-papers/production-machine-performance-monitoring This webpage provides an article relating to Production, Machine & Performance Monitoring as it relates to increasing plant efficiency and automation, process control, and instrumentation applications. [Retrieved January 6, 2019]</p> <p>❖ Semiconductor Equipment Repair Services Information https://www.globalspec.com/learnmore/calibration_testing_services/semiconductor_equipment_repair_services This webpage provides information on semiconductor equipment repair services repair, rebuild and refurbish equipment related to the manufacture and processing of semiconductors, special materials that have conductivity between conductors and nonconductors or insulators. Some companies test, evaluate, disassemble, and reassemble semiconductor manufacturing and processing equipment. [Retrieved January 6, 2019]</p>
<p>HDD Front-of-line Operations NC II</p> <p>This Qualification consists of competencies that must be possessed to work in an electronics company engaged in production of hard disk drive front-of-line products. This qualification involves such competencies to enable a person to set up FOL operations workplace, analyze, carry-out and monitor FOL operations and check quality compliance of FOL operations for HDD production line.</p> <p>Core Competencies</p> <ul style="list-style-type: none"> • Set up front-of-line (FOL) operation workplace for hard disk drives (HDD) production line • Analyze, carry-out and monitor front-of-line (FOL) operation for hard disk drives (HDD) production line • Check quality compliance of front-of-line (FOL) operation for hard disk drives (HDD) production line 	<p>❖ How Does a Hard Drive Work? https://www.makeuseof.com/tag/technology-explained-how-does-a-hard-drive-work-nb/ This webpage provides information on the operation of hard drives and how data is stored. [Retrieved January 6, 2019]</p> <p>❖ Definition of Front Line Management https://smallbusiness.chron.com/definition-frontline-management-24345.html This webpage provides information on the operation of hard drives and how data is stored. [Retrieved January 6, 2019]</p> <p>❖ What is Involved in Production Line Monitoring https://www.twi-global.com/technical-knowledge/faqs/faq-what-is-involved-in-production-line-monitoring-and-control This webpage provides information on the activities of planning, monitoring and control required in the production process. [Retrieved January 6, 2019]</p> <p>❖ Storage Products https://toshiba.semicon-storage.com/us/product/storage-products.html This webpage provides information and links to HDD products. It includes videos and links to related topics on Toshiba's electronic devices and storage corporation. [Retrieved January 6, 2019]</p> <p>❖ Disk Storage https://azure.microsoft.com/en-us/services/storage/disks/ This webpage provides information on HDD characteristic that measure durability, scalability, availability and security. [Retrieved January 6, 2019]</p>
<p>Instrumentation and Control Servicing NC II</p> <p>This Qualification consists of competencies that a person must achieve to enable him/her to install,</p>	<p>❖ Instrumentation and control servicing definition http://en.wikipedia.org/wiki/Instrumentation_and_control_engineering This webpage provides descriptions of Instrumentation and control engineering as the art and science of measurement and control of process variables within a production or manufacturing area. The process variables used in industries are Level, Pressure, Temperature, Humidity, Flow, pH,</p>

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calibrate, and configure various instrumentation & control devices and systems, as well as microcomputer hardware, operating systems, common user applications, network systems, and various common peripherals in a manufacturing or processing environment.

Core Competencies

- Install Instrumentation and Control Devices
- Calibrate Instrumentation and Control Devices
- Configure Instrumentation and Control Devices

Instrumentation and Control Servicing NC III

This qualification consists of competencies that a person must achieve to enable him/her to loop check, maintain, and repair various instrumentation & control devices and systems, as well as microcomputer hardware, operating systems, common user applications, network systems, and various common peripherals in a manufacturing or processing environment.

Core Competencies

- Loop Check Instrumentation and Control Devices
- Maintain and Repair Instrumentation and Control Devices

Instrumentation and Control Servicing NC IV

This qualification consists of competencies that a person must possess to enable him/her to startup, commission, diagnose and troubleshoot instrumentation & control devices and systems, as well as microcomputer hardware, operating systems, common user applications, network systems, and various common peripherals in a manufacturing or processing environment.

Core Competencies

- Start-up and Commissioning Instrumentation & Control

Force, Speed etc.

[Updated February 18, 2019]

❖ Instrumentation and control servicing NC II in the Philippines

<http://www.courses.com.ph/instrumentation-and-control-servicing-nc-ii-tesda-course-philippines/>

This webpage provides brief introduction of the course including admission, assessment and certification requirements.

[Updated February 18, 2019]

❖ Basic Instrumentation Measuring Devices and Basic PID Control

<http://www.pacontrol.com/download/BASIC-INSTRUMENTATION-MEASURING-DEVICES-AND-BASIC-PID-CONTROL.pdf>

This webpage provides information about measuring devices for use in instrumentation and control servicing.

[Updated February 18, 2019]

❖ Basic Principles of Instrument Calibration

<https://www.instrumentationtoolbox.com/2012/12/understanding-instrument-calibration.html>

This webpage provides information about the principles in calibrating instrumentation devices.

[Retrieved February 18, 2019]

❖ How to Configure MBE Driver?

<http://vakratoond.com/instrumentation/configure-mbe-driver/>

This webpage provides information in configuring Modbus Ethernet (MBE) driver.

[Retrieved February 18, 2019]

❖ WirelessHART device Configuration

<https://instrumentationtools.com/wirelesshart-device-configuration/>

This webpage provides information in configuring WirelessHART field instruments i.e. the Rosemount model 648 temperature transmitters.

[Retrieved February 18, 2019]

❖ Loop Checking of 4-20mA or HART Transmitters

<https://instrumentationtools.com/loop-checking-4-20-mahart-transmitters/>

This webpage provides information in loop checking 4-20 mA HART transmitter

[Retrieved February 18, 2019]

❖ Troubleshooting Instrumentation & Control Systems

http://www.isawwsymposium.com/wp-content/uploads/2014/09/WWAC2014_Invited_Lovell_presentation.pdf

This webpage provides a PowerPoint presentation that guides in troubleshooting instrumentation and control systems.

[Retrieved February 18, 2019]

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<p>Systems</p> <ul style="list-style-type: none"> Diagnose and Troubleshoot Instrumentation & Control Systems 	
<p>Mechatronics Servicing NC II</p> <p>This qualification consists of competencies that must be possessed to enable a person to install, configure and test mechatronics and automation devices/system.</p> <p>Core Competencies</p> <ul style="list-style-type: none"> Install Mechatronics Devices Configure and Test Mechatronics Devices 	<p>❖ Mechatronics definition http://en.wikipedia.org/wiki/Mechatronics This webpage provides descriptions of mechatronics as a multidisciplinary field of engineering that includes a combination of mechanical engineering, electrical engineering, telecommunications engineering, control engineering and computer engineering. As technology advances the subfields of engineering multiply and adapt. Mechatronics' aim is a design process that unifies these subfields. [Updated February 18, 2019]</p> <p>❖ How to install Scilab under Windows https://x-engineer.org/graduate-engineering/programming-languages/scilab/how-to-install-scilab-under-windows/ This webpage provides information and guide in installing Scilab 5.4.0 under Windows as programming/ simulation environment [Updated February 18, 2019]</p> <p>❖ How to use Device Manager to configure devices in Windows Server 2003 https://support.microsoft.com/en-gb/help/323423/how-to-use-device-manager-to-configure-devices-in-windows-server-2003 This webpage provides a guide in using device manager to configure hardware devices that are installed on Windows Server 2003-based computer. [Updated February 18, 2019]</p> <p>❖ 19 Mechatronics engineer jobs in the Philippines http://www.careerjet.ph/mechatronics-engineer-jobs.html This webpage provides information and list of job opportunities in mechatronics industry from technician level up to mechatronics engineers. [Updated February 18, 2019]</p> <p>❖ Mechatronics and robotics society of the Philippines https://jrcanedo2.files.wordpress.com/2008/02/mrsp_overview.pdf This webpage provides information about the MRSP, its mission and objectives, research, education and training certification, promotion, information network, membership and linkages benefits, addresses and contacts. [Updated February 18, 2019]</p>
<p>Mechatronics Servicing NC III</p> <p>This qualification consists of competencies that must be possess to enable a person to develop mechatronics and automation control circuits and PLC software programs, develop motion control and system configuration on mechatronics and automation system as well as to maintain and repair PLC-based mechatronics and automation devices.</p> <p>Core Competencies</p> <ul style="list-style-type: none"> Develop Mechatronics Control Circuits and Software Application Programs Maintain and Repair Mechatronics Devices 	
<p>Mechatronics Servicing NC IV</p> <p>This qualification consists of competencies that must be possess to enable a person to develop advanced PLC and HMI software programs and perform commissioning, diagnostics & troubleshooting on advanced PLC- and HMI-based mechatronics and automation systems.</p> <p>Core Competencies</p> <ul style="list-style-type: none"> Commission Mechatronics Systems Diagnose and Troubleshoot Mechatronics Systems 	
<p>Semiconductor Back-End Operation NC II</p>	<p>❖ A Guide to Manufacturing Production https://www.thebalancesmb.com/manufacturing-process-2221376</p>

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This qualification consists of competencies that must be possessed to enable a person to work in a semiconductor company engaged in production of semiconductor back-end products. This qualification involves such competencies to prepare the workplace, analyze, carry-out and monitor backend operations and check quality compliance of back-end operations for semiconductor production line.

Core Competencies

- Set up back-end operations workplace for semiconductor production line
- Analyze, carry-out and monitor back-end operations for semiconductor production line
- Check quality compliance of back-end operation for semiconductor production line

This webpage provides information on setting up a production line for small scale business. It describes the requirements and methods to customize the production line.

[Retrieved 8 January 6, 2019]

❖ **Electronic Product Manufacturing**

<https://www.startupbizhub.com/electronic-product-manufacturing.htm>

This webpage provides information on setting up a production line for business. It also includes links to related topics.

[Retrieved 8 January 6, 2019]

❖ **What makes a good production plan?**

<httpsttps://www.bdc.ca/en/articles-tools/operations/operational-efficiency/pages/production-plan-top-tips-improving-operations.aspx>

This webpage provides information and strategies to maximize productivity of a production line company.

[Retrieved 8 January 6, 2019]

Semiconductor Front-of-line Operation NC II

This qualification consists of competencies that must be possessed to enable a person to work in a semiconductor company engaged in production of semiconductor front-of-line products. This qualification involves such competencies to set up the FOL operations workplace, analyze, carry-out and monitor FOL operations and check quality compliance of FOL operations for semiconductor production line.

Core Competencies

- Setup front-of-line (FOL) operations workplace for semiconductor production line
- Analyze, carry-out and monitor front-of-line (FOL) operations for semiconductor production line
- Check quality compliance of front-of-line (FOL) operations for semiconductor production line

❖ **How to Set Up a Lean Factory That Works, Part I**

<https://www.industryweek.com/continuous-improvement/how-set-lean-factory-works-part-1>

This webpage provides information on setting up a lean-oriented production layout for seamless flow of people, material and information.

[Retrieved 8 January 6, 2019]

❖ **Seven Common KPIs for Production Monitoring**

<http://www.redlion.net/resources/white-papers/seven-common-kpis-production-monitoring>

This webpage provides strategic philosophers or practices in manufacturing using Kaisen, Six Sigma, Total Quality Management and Continuous Improvement.

[Retrieved 8 January 6, 2019]

❖ **Product Inspection Monitoring**

<https://www.qima.com/quality-control-services/product-and-manufacturing-inspections>

This webpage provides strategies in inspecting various stages of the manufacturing process to help secure production and safeguard quality of products.

[Retrieved 8 January 6, 2019]