education

Department of Education
REPUBLIC OF SOUTH AFRICA

NATIONAL CURRICULUM STATEMENT
GRADES 10-12

SUBJECT:
MECHANICALTECHNOLOGY

TEACHER TRAINING MANUAL
2006

CONTENTS

PROGRAMME

PERIOD: Monday to Friday

DURATION: 36-37 hours

5-DAY PROGRAMME FOR TEACHERS-

SESSION	ACTIVITY	TIME	DAY
1. Introducing the National Curriculum Statement (NCS) and the National Senior Certificate (NSC)	Introduction of training participants	3-4 hours	Mon AM
	Overview of the week of training / documents provided		
	Introduction to the NCS and NSC		
2. Introducing the Subject Statement	Introduction	20 hours	Mon PM – Wed PM
	2.1 What is new? Audit		
	2.2 Content and competencies		
	2.3 Integration of Learning Outcomes and Assessment Standards		
	2.4 What SKVs are imparted		
	2.5 Implications for teaching and learning		
	2.6 Implications for assessment		
	2.6 Designing MECHANICAL Technology questions		
	Conclusion / Wrap-up		
3. Planning for teaching subjects in the NCS	The Planning Cycle	8 hours	Thurs
	The Grade 11 Work Schedule		
	Critique of the Grade 11 Work Schedule		
	Development of the first Lesson Plan for Grade 11		
4. Annual assessment plan	Introduction	5 hours	Fri AM
	Annual assessment plan		
	Conclusion / Wrap-up		

SESSION 1 –
Introducing the National Curriculum Statement (NCS) and the National Senior Certificate (NSC) (3-4 hours)

ACTIVITY 1: Introduction of training participants

FORM OF ACTIVITY: Introductions

ACTIVITY 2: Overview of the week of training / documents provided

FORM OF ACTIVITY: Presentation

RESOURCES: The 5-day training programme (PowerPoint)
A hard copy of each document referred to-

- National Senior Certificate Policy
- Subject Statement
- Subject Assessment Guidelines
- Learning Programme Guidelines
- Teacher Guide – only applicable to Mathematical Literacy and Life Orientation
- National Protocol on Assessment
- Higher Education admission requirements

CONTENT:

- Training programme for the week and house rules
- Documents making up the National Curriculum Statement policy and documents supporting the National Curriculum Statement policy – purpose and status of each

ACTIVITY 3: Introduction to the NCS and NSC

Part 1: 20 Questions

FORM OF ACTIVITY: Test and discussion

RESOURCES: PowerPoint Presentation, Laptop, and Data Projector

CONTENT:

- 20 questions focusing on the NCS and NSC

INSTRUCTIONS:

- Allow the participants to record their responses to each question as individuals
- Discuss the answers with the group as a whole, inviting participants to offer answers before discussing them

Part 2: NCS and NSC

FORM OF ACTIVITY: Presentation and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, a hard copy of each document referred to in the presentation-

- National Senior Certificate Policy
- Subject Statement
- Subject Assessment Guidelines
- Learning Programme Guidelines
- National Protocol on Assessment

CONTENT:

- Overview of the NCS, including principles and Critical and Developmental Outcomes
- National Senior Certificate: Requirements, structure and details

Part 3: Requirements for Higher Education study

FORM OF ACTIVITY: Open-book and presentation

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, HE admission requirements

CONTENT:

- Requirements for certificate, diploma and degree programmes

INSTRUCTIONS:

Introduction

- While the Higher Education document is not part of NCS policy, it provides teachers with indicators on required learner performance in NCS subjects for entry into Higher Education
- The 3-year NSC programme is the key to Higher Education study and teachers need to be aware of the admission requirements for different programmes offered at Higher Education Institutions

Open-book activity

- Ask participants to study the HE document and identify the requirements for certificate, diploma and degree programmes

Report back and discussion

- Allow one report back
- Present the requirements (see PowerPoint Presentation)
- Discuss the designated list of subjects, noting that learners already have 3 of the designated subjects in their NSC package – two languages and Mathematics or Mathematical Literacy

SESSION 2 –
Introducing the Subject Statement (20 hours)

INTRODUCTION	OVERVIEW OF MECHANICAL TECHNOLOGY INTEGRATION ACROSS LEARNING OUTCOMES
ENGAGEMENT:	Power Point Presentation
TIME ALLOCATION:	I hr
RESOURCES:	PowerPoint Presentation, Laptop, Data Projector, Subject Statement

Introduction:

- Overview of the subject: Definition, purpose and scope of the subject – its origin
- Learning Outcomes for the subject.
- Mention of supporting policies relevant to the subject and how they support the implementation of the subject MECHANICAL TECHNOLOGY (do not engage in them)
- Time allocation and placement of MECHANICAL TECHNOLOGY in the school timetable. To be discussed in the activity on IMPLICATIONS FOR LEARNING, TEACHING AND ASSESSMENT.

Activity 1	What content is new – i.e. which is unknown to you? (Knowledge gaps: Mechanical Technology Grades 10, 11 and 12)
ENGAGEMENT:	Participants will identify any knowledge and skills gaps within the subject which they might have and for which they need further training.
TIME ALLOCATION:	60 minutes
RESOURCES:	Check list

INSTRUCTIONS:
The facilitator hands out a checklist, which includes suggested concepts and content required to achieve the Learning Outcomes of Mechanical Technology
The aim of the checklist is to identify any knowledge and skills gaps within the subject which you might have and for which you need further training.
Each participant must complete the checklist and hand it to the facilitator who will make a duplicate copy and return it to you later during the week.

CHECKLIST
Name: _____ **School:** _____
Province_____ **District**: _____

The aim of this checklist is to identify any knowledge gaps within the subject specifics which you might have and for which you need further training.

Rate yourself (as honestly as possible) for your personal development against the observable behaviours in the table below. Mark the column that represents your ***current*** level of competence:

The following key applies:

- **O = Outstanding:** significantly above requirements for successful task performance.
- **E = Excellent:** exceed requirements for successful task performance.
- **S = Satisfactory:** meets requirements for successful task performance.
- **M = Marginal:** below requirements for successful task performance.
- **U = Unsatisfactory:** significantly below requirements for successful task performance.

LO 3 **GRADE 10**	**POSSIBLE CONTENT FOR THE ASSESSMENT STANDARD**	**O**	**E**	**S**	**M**	**U**
SAFETY 10.3.1 demonstrate an understanding of the Occupational Health and Safety (OHS) Act where applicable	Learners must be fully aware of all the safety precautions to be taken during performance based activities in order to avoid injuries or incidents.					
SAFETY 10.4.1 apply all relevant safety measures	Identifies and prevent hazardous conditions by taking precautions to avoid injuries and accidents in terms of: Good housekeeping, machine guards, covering of transmission belts, protruding shaft ends and avoid sharp edges; No adjustment or maintenance on running machines; Proper and safe stacking of objects; Proper lighting; Clean and dry workplace, floor space, condition of floors; Working at safe speed; Safe electrical extensions; Using tools within capacity limits; Safe practices and good personal habits, protective equipment and clothing; Safety switches, colour coding and signs; and Emery wheels, cutting discs and grinding equipment, etc.					

TOOLS 10.3.2 describe the principles and functions of appropriate basic tools and equipment	**Basic tools and equipment such as:** Spanners: ring-, flat - and combination Sockets and accessories; Pliers: combination, cyclic, diagonal, long nose and water pump pliers; Chisels, hammers, hacksaws, scribers, punches, steel rulers, engineering squares and measuring tapes; Screwdrivers: flat- Phillips / star and off set; and Files, smooth and bastard: flat -, square-, triangle – round and half round shapes etc.					
TOOLS 10.4.2 select, use and care for appropriate basic tools and equipment	**Basic tools and equipment** • Spanners; ring, flat, combination; • Sockets and accessories; • Pliers; combination, circlip, side cutter, long nose, water pump pliers; • Chisels, hammers, hacksaws, scribers, punches, steel rulers, engineering squares; • Screwdrivers, flat, Phillips / star, off set; and • Files: flat, square, triangle, round, etc. **Identifying:** • excessive wear, over heating, ceasing and distortion on different components. • perform basic routine maintenance					
MATERIALS 10.3.3 explain the reason for using certain engineering materials by taking environmental aspects into consideration	**Ferrous metals:** • Cast iron, grey cast iron, white cast iron; and • Steel, chrome - nickel, vanadium, manganese, nickel, spring steel, wolfram, etc. **Non ferrous metals:** • Copper, tin, lead, zinc and aluminium, etc. **Non ferrous alloys:** • Yellow copper, bronze, phosphor bronze, white metal, duralumin, solder and silver solder, etc. ***Composites:*** Nylon, Teflon, Carbon and Glass Fibre and Polly Vinyl Composite (PVC), Vesconite, etc.					
TERMINOLOGY 10.3.4 demonstrate an understanding of appropriate terminology and procedures used in the subject including but no limited to lathes and milling machines	South African National Standards (SANS) as applicable to Mechanical Technology, but not only limited to SANS. Cutting procedures Including but no limited to lathes, milling, drilling, machines and power saws					

TERMINOLOGY 10.4.4 use instructions or basic drawings and apply different cutting methods to make an artefact	**Interpretation of terminology:** • Demonstrate the correct interpretation of terminology by using the given criteria; and • Apply different cutting methods on a lathe to make a basic artefact					
JOINING METHODS 10.3.5 explain the uses of semi-permanent joining applications	**Semi-permanent joining application** Bolts, studs, locking devices, nuts, split pins, rivets and keys etc.					
JOINING METHODS 10.4.5 use working instructions and apply basic relevant joining methods	**Apply semi-permanent joining applications:** • Demonstrate the correct interpretation of terminology by using the given criteria; and • Then make a lap joint by using a variety of jointing techniques which include rivets, bolts, nuts and other locking devices					
FORCES 10.3.6 distinguish between different types of forces found in engineering components by graphically determining the nature of these forces	**Forces found in engineering components*:*** • Triangle and polygon of forces e.g. resultant, equilibrant, addition of vectors, (balancing on a lathe), etc.					
FORCES 10.4.6 perform basic tests on various mechanical principles	**Testing of concepts such as:** • forces, pressure and torque using gauges, meters and instruments.					
MAINTENANCE 10.3.7 explain the effect of a lack of maintenance on operating systems	**Causes of lack of maintenance such as:** • Excessive wear • Overheating / ceasing; and distortion; and • Failure e.g. hydraulics/ pneumatics, controls and cables					
SYSTEMS AND CONTROL 10.3.8 describe the functions of components applicable to different operating systems and the control thereof, such as mechanical, hydraulics and pneumatic systems	**Mechanical:** Gears, pulleys, belts, chains, cables, threads and linkages, wheels and axles, clutches, levers and cams, etc. **Hydraulics / Pneumatics** Valves, pipes, pressure gauges, pistons and reservoirs, vessels under pressure, etc. ***Electrical / Electronic control*** warning lights, sender units and gauges, etc.					

SYSTEMS AND CONTROL 10.4.8 demonstrate competency on basic systems and control	**Mechanical:** • Experiment with equipment (kits) containing levers, linkages and gear- and pulley ratios as found in practice on electrical press drills, lathes and other manual gearboxes; • Investigate examples of components such as oil pumps, fuel pumps and valves; and • Investigate examples driven by cams (timing and synchronising), wheels, axles and differentials,. **Hydraulics and Pneumatics:** • Experiment with hydraulic and pneumatic equipment (kits) to demonstrate how Mechanical Advantage can be achieved. Automatic gearboxes, torque converters, power steering, brake systems are practical applications of these principle **Electrical / Electronic control:** • Experiment with warning light circuits, sender units and gauges, etc.					
HEAT ENGINES 10.3.9 describe the operating principles of heat engines	**Internal combustion engine:** • Four stroke and two stroke petrol engines; and • Four and two stroke diesel engines **External combustion engine:** • Reciprocating steam engine					
HEAT ENGINES 10.4.9 Demonstrate understanding of main functions of components required for IC engines	**Identify the main components such as:** pistons, rings, crankshaft, connecting rod, gudgeon pin, camshaft, cam and crank gears, valves, bearings, etc.					

LO 3 **GRADE 11**	**POSSIBLE CONTENT FOR THE ASSESSMENT STANDARD**	**O**	**E**	**S**	**M**	**U**
SAFETY 11.3.1 analyse the OHS Act and regulations where applicable	**Machine specific safety measures when dealing with:** • Grinding machines (portable, bench and surface); • Cutting machines(drilling machines, power saw, lathes and milling); • Shearing machines (manual and power driven); • Press machines; • Joining equipment (arc, spot, gas); and • Handling gas bottles, etc.					

SAFETY 11.4 1 apply all relevant safety measures	**Apply basic and machine specific safety measures when dealing with:** • Grinding machines (portable, bench and surface); • Cutting (drilling machines, power saw, lathes and milling machines); • Shearing machines (manual and power driven); • Press machines; • Joining (arc, spot, gas); and • Handling and usage of gas bottles, etc.					
TOOLS 11.3.2 explain the principles and functions of purpose made tooling and equipment	**Purpose made tooling and equipment such as:** • Dial indicators and • Verniers, callipers, inside- and outside micrometers, torque wrenches, stocks and dies, Johannson gauge blocks, sine bars, toolmakers buttons, etc. **Causes of malfunction of operating systems are:** Lack of lubrication or incorrect lubricant; Overloading friction; Balancing; and • Alignment etc.					
TOOLS 11.4.2 demonstrate the care and use of hand and power tools	**Use with care purpose made tooling and equipment such as:** • Grinding machines (portable, bench and surface); • Cutting (drilling machines, power saw, lathes and milling machines); • Shearing machines (manual and power driven); • Press machines; • Joining (arc, spot, gas); • Dial indicator; and • Verniers, callipers, inside- and outside micrometers, torque wrenches, Johannson gauge blocks, sine bars, toolmakers buttons, etc.					
MATERIALS 11.3.3 describe the ways of enhancing the properties of engineering materials by taking environmental aspects such as waste management into consideration	**Methods of enhancing the properties of steel such as:** Tempering; Case hardening Hardening; Annealing; and Normalising, etc.					
MATERIALS 11.4.3 apply measures to effect changes to the properties of materials so as to	**Apply relevant measure to demonstrate competency in the following heat treatment processes:** Tempering; and Case hardening					

enhance their suitability	**Tasks on the following optional**: Hardening; Annealing; and Normalising					
TERMINOLOGY 11.3.4 describe applicable terminology encountered in the subject	South African National Standards (SANS) as applicable to Mechanical Technology, but not only limited to SANS.					
TERMINOLOGY 11.4.4 use intermediate instructions and drawings and apply different cutting methods to make an artefact	**Interpretation of terminology:** • Demonstrate the correct interpretation of terminology by using the given criteria; and Apply different cutting methods on a lathe to make an artefact					
JOINING METHODS 11.3.5 explain the uses of permanent joining applications	**Permanent joining applications such as:** Soft – and hard soldering; Gas welding (oxy-acetylene); Arc welding; and Spot welding, etc.					
JOINING METHODS 11.4.5 use working instructions and apply complex but relevant joining methods	**Applying permanent joining applications**: • Demonstrate the correct interpretation of terminology by using the given criteria; and Then make joints by using a variety of jointing techniques which includes soft - and hard soldering, gas welding (oxy-acetylene), arc - and spot welding					
FORCES 11.3.6 demonstrate an understanding of the effects of forces, moments and torques on engineering components applying design principles	**Basic calculations on:** Moments, forces and torques and the units thereof: e.g. F= m x a units Newton; e.g. Torque = Force x Radius.					
FORCES 11.4.6 perform intermediate tests on various mechanical principles	**Testing of concepts such as:** bending moments and stresses, struts and tie using gauges and meters.					
MAINTENANCE 11.3.7 analyse the causes of malfunction of operating systems	**Causes of malfunction of operating systems is:** • Lack of lubrication or incorrect lubrication; • Overloading friction • Balancing ; and • Alignment, etc.					

MAINTENANCE 11.4.7 evaluate and report on the deterioration of various mechanical components	Monitoring the conditions of components in various mechanical systems and performing fault finding procedures on fuel systems, ignition circuits, timing, etc. **Tasks on the following are optional:** Overloading; Balancing; and Alignment, etc.					
SYSTEMS AND CONTROL 11.3.8 analyse the operation of components applicable to systems and the control thereof	**Mechanical:** Gears, pulleys, belts, chains, cables, threads and linkages, wheels and axles, clutches, levers and cams, etc. **Hydraulics / Pneumatics** Valves, pipes, pressure gauges, pistons and reservoirs, etc. ***Electrical / Electronic control*** ABS brakes, traction control, air bag control, fuel injection, ignition timing, etc.					
SYSTEMS AND CONTROL 11.4.8 demonstrate competency on intermediate systems and the control thereof	**Mechanical:** Gears, pulleys, belts, chains, cables, threads and linkages, wheels and axles, clutches, levers and cams, etc. **Hydraulics / Pneumatics** Valves, pipes, pressure gauges, pistons and reservoirs, etc. ***Electrical / Electronic control*** ABS brakes, traction control, air bag control, fuel injection, ignition timing, etc. Examine mechanical, hydraulic- (brakes), fuel – and pneumatic systems as found on equipment and vehicles					
PUMPS 11.3.9 describe the operating principles of pumps	***Principles of pumps such as:*** Mono pumps; Centrifugal pumps; Reciprocating pumps; Gear pumps; Vane pumps; and Rotor pumps, etc.					
PUMPS 11.4.9 demonstrate understanding of the operating principles of pumps	**Present models of different types of pumps as a project e.g. gear pump made out of foamalite** • Read pressures of different pumps and compare with specifications					

LO 3 GRADE 12	POSSIBLE CONTENT FOR THE ASSESSMENT STANDARD	O	E	S	M	U
SAFETY 12.3.1 apply the OHS Act and regulations where applicable	**Machine specific safety measures when dealing with:** • Grinding machines (portable, bench and surface): • Cutting (drilling machines, power saw, lathes and milling machines); • Shearing machines (manual and power driven); • Press machines; Joining (arc, spot, gas); and Handling and usage of gas bottles, etc.					
SAFETY 12.4.1 apply all relevant safety measures	**Apply basic and machine specific safety measures in dealing with:** • Grinding machines (portable, bench and surface); • Cutting (drilling machines, power saw, lathes and milling machines); • Shearing machines (manual and power driven); • Press machines; • Joining (Gas Metal Arc Welding); and • Handling and usage of gas bottles, etc.					
TOOLS 12.3.2 describe the principles and functions of advanced engineering equipment	**Advanced engineering equipment such as:** • Gas analysers; • Brinnel harden testers; • Multimeters; • Pressure testers; • Spring testers; • Cylinder leakage testers; • Torsion testers; • Moments and forces testers; • Beam bending testers; and • Tensile testers					
TOOLS 12.4.2 apply care and use of appropriate specialised mechanical equipment	**Use with care:** • Gas analyser; • Brinnel harden tester; • Multimeters; • Pressure testers; • Spring tester; • Cylinder leakage tester; • Torsion tester; • Moments and forces tester; • Beam bending tester; and • Tensile tester					
MATERIALS 12.3.3 classify the enhanced materials according to their properties, uses and environmental aspects	***Non ferrous alloys*:** • Yellow copper, bronze, phosphor bronze, white metal, duralumin, solder and silver solder, etc. **Composites:** • Nylon, Teflon, carbon fibre and Polly Vinyl Composite (PVC), etc.					

MATERIALS 12.4.3 select materials suitable for their application	Identify uses of materials with enhanced properties (tempering and case hardening) in practical applications (e.g. crankshafts, camshafts and piston rings, etc.)					
TERMINOLOGY 12.3.4 apply correct terminology in the proper context	South African National Standards (SANS) as applicable to Mechanical Technology, but not only limited to SANS.					
TERMINOLOGY 12.4.4 use advanced instructions and / or drawing and apply different cutting methods to make an artefact	**Interpretation of terminology:** • Demonstrate the correct interpretation of terminology by using working instructions; • Apply different cutting methods on a milling machine to make an artefact					
JOINING METHODS 12.3.5 analyse the incorrect application of joining methods	**Possible defects by visual inspection:** • Porosity; • Slag inclusion; • Welding craters; • Incomplete penetration; • Undercutting; • Chamfering; • Faulty restart; and • Incorrect settings, etc. **Destructive tests:** • Nick break; and • Nick bend **Non-destructive tests:** • X-rays; • Dye penetration; and • Ultrasonic tests, etc.					
JOINING METHODS 12.4.5 use working instructions and apply advanced but relevant joining methods	**Applying advanced permanent joining applications:** • Demonstrate the correct interpretation of terminology by using the given criteria; • Then make joints by using a variety of jointing techniques which includes Gas Metal Arc Welding; and • Visual inspections of welded joints					
FORCES 12.3.6 demonstrate an understanding of the concepts of stress, strain and modulus of elasticity	**Calculation of:** • Stress and strain; • Compressive / tensile stresses ; and • Young's model of elasticity					
FORCES 12.4.6 perform advanced tests on various mechanical principals	**Testing of complex concepts such as:** • Advanced bending moments, shear forces, stresses, strains and elasticity using gauges and meters.					

MAINTENANCE 12.3.7 identify the most suitable preventative maintenance in operating systems	**Before lubricant loses its properties like viscosity it must be replaced e.g.** • Transmission oil; • Engine oil; • Differential oil; • Cutting fluid; • Lubrication on bearings and linkages; etc. Replacement of belt and chain drives, clutches, etc.					
MAINTENANCE 12.4.7 suggest applicable repair methods and adjustments to various systems	Apply various methods of repairing of and adjustment to mechanical systems					
SYSTEMS AND CONTROL 12.3.8 use calculations to demonstrate understanding of systems and control to explain fault finding techniques on operating systems	**Use of simple calculations related to power transmission systems on the following:** • Belt, gears, pulleys, cams, levers, threads and linkages, wheels and axles, hydraulic and pneumatic, clutches (friction), etc. **Check the following:** • Ignition (spark), fuel, the machine must rotate, power supply (battery); • Hydraulics: fluid, pressure, and relief valves, pistons, seals, pipe connections e.g. brakes; and • Pneumatics: vacuum, pressure, valves, pistons, diaphragms, vacuum meters, as found in the motor industry and food industry;					
SYSTEMS AND CONTROL 12.4.8 demonstrate competency on advanced systems and control	**Electrical / Electronic control** • Apply relevant methods of repairing to: • Integrated electrical / mechanical systems e.g. electronic ignition, Anti-lock Braking System (ABS), etc. Electronic control					
TURBINES 12.3.9 describe the operating principles of turbines	Principles of turbines such as: • Roots blowers; • Vane compressors; • Centrifugal blowers; and • Turbo – super chargers					
TURBINES 12.4.9 demonstrate understanding of the operating principles of turbines.	• Identify different types of turbines, their components and the function thereof					

How do you intend filling the knowledge and skills gaps you experience?

_____
_____
_____
_____

Activity 2 **2.1** **2.2**	**CONTENT AND COMPETENCIES TAUGHT PER LEARNING OUTCOME AND PER GRADE**
ENGAGEMENT:	Identify and analyse content, context and competencies imbedded in the LOs and ASs for MECHANICAL Technology.
TIME ALLOCATION: 60 minutes	
RESOURCES:	Worksheet and flip chart Subject Statement and Learning Programme Guidelines for MECHANICAL Technology

INSTRUCTIONS:

2.1

Use the worksheet below to complete the task.

- The content and competencies in one Assessment Standard is given in the example.
- Reproduce the table on a flip chart showing **all** the Assessment Standards for each of the Learning Outcomes.
- Identify and analyse the content, context and competencies imbedded in the Learning Outcomes and Assessment Standards of MECHANICAL Technology for Grades 10, 11 and 12.
- Participants to work in pairs.

2.2

- Use your completed table and examine it for progression which is evident within the Learning Outcome and across the three grades? Provide examples of such progression. Write this down in your manual.
- Should any of the content be re-organised to display progression across the grades? Identify this content.
- Participants will report back as indicated by the facilitator.
- Allow each presenter approximately 5 minutes to give his/her presentation to the plenary.
- Facilitator allows comments/questions from the other groups.

LO 1: **Technology, Society and the Environment**	**LO 2:** **Technological Process**	**LO 3:** **Knowledge and understanding** (Theoretical)	**LO 4:** **Application of knowledge** (Practical work)
Identify the **key words/noun** in the AS that provides content for the lesson			
Identify the **verb** in the AS which will generate the evidence (competency)			
Example: **AS**: 1 **Content**: Environmental technology **Competency/ Concepts**: Gr. 10: Describe Gr. 11: Discuss & Evaluate Gr. 12: Predict	AS: Content: Competency/ Concepts: Gr. 10: Gr. 11: Gr. 12:	AS: Content: Competency/ concepts: Gr. 10: Gr. 11: Gr. 12:	AS: Content: Competency concepts: Gr. 10: Gr. 11: Gr. 12:

WRAP-UP

How and why do we use the Assessment Standards in the design and delivery of a lesson? (Verb: evidence learner generates, Noun refers to the content of the lesson). Assessment Standards also refer to how much evidence and what level they have to be produced.

Activity 3	THE INTEGRATION OF LEARNING OUTCOMES AND ASSESSMENT STANDARDS WITHIN MECHANICAL TECHNOLOGY
ENGAGEMENT:	3.1 Demonstrate an understanding of the integration of LOs and ASs within MECHANICAL Technology 3.2 Demonstrate an understanding of the integration of LOs and ASs of MECHANICAL Technology with other Technology subjects.
TIME ALLOCATION:	100 minutes
RECOURSES:	NCS, LPG and worksheets, flip chart, Koki pens Power point presentation
METHOD (S):	Presentation, working in pairs

INTRODUCTION (10 minutes)

- Facilitator introduces the activity
- Explaining the concept of integration within a Learning Outcome and across Learning Outcomes.
- Explaining the concept of the integration of MECHANICAL Technology with other subjects

LO 1	LO 2	LO 3	LO 4
Technology, Society and the Environment	**Technological Process**	**Knowledge and understanding** (Theoretical)	**Application of knowledge** (Practical work)
11.1.1 discuss and evaluate the interrelationship between technology, society and the environment	11.2.1 identify, investigate, define, analyse problems in a given real life situation	11.3.1 demonstrate an understnding of an **Occupational Health** and **Safety** (OHS Act.) and regulations where applicable	11.4.1 apply all relevant **safety** measures
		11.3.2 Explain the functions of purpose- made **tools** and **equipment**	**11.4.2** Demonstrate the care and use of hand and power tools
11.1.2 consideration of human rights issues and discuss fair and equal employment practices	11.2.2 generate and/or design possible solutions for problems	**11.3.3** Describe the ways of enhancing the properties of engineering materials by taking environmental aspects like waste management into consideration.	**11.4.3** Apply measures to effect changes to the properties of materials so as to enhance the suitability
		11.3.4 Describe applicable terminology encountered In the subjectf	**11.4.4** Use intermediate instructions and drawings and apply different cutting methods to make an artefact
11.1.3 describe, explain and respond to basic medical emergencies in context, taking cognisance of health issues such as HIV/AIDS	11.2.3 make/ improve products according to the selected design	**11.3.5** Explain the uses of permanet joining applications	**11.4.5** Use working instructions and apply complex but relevent joining methods
		11.3.6 Demonstrate an understanding of the effects of forces, moments and torque on engineering components applying design principles	11.4.6 perform intermidiate tests to verify various mechanical principles
11.1.4 Compare how different cultures solve technological problems	11.2.4 evaluate the product against the initial design	**11.3.7** Analyse the causes of malfunctioning of operating systems	11.4.7 Evaluate and report on the deterioration of various mechanical components
		11.3.8 analyse the operation of components applicable to mechanical and / or electronic systems and control	11.4.8 demonstrate competency on intermediate systems and control
11.1.5 discuss the competencies required by entrepreneurs	11.2.5 present assignments by means of a variety of communication media	**11.3.9** Describe the operating principles of pumps	11.4.9 Demonstrate an understanding of operating principles of pumps

Wrap-up **(30 minutes)**

1	Suggest ways in which the Technology subjects can be integrated?
2	What is the significance of clustering the Learning Outcomes and Assessment Standards when planning for assessment?

Activity 4	**WHAT MUST THE LEARNER KNOW, CAN DO AND VALUE AFTER EXPOSURE TO THE CONTENT IN THE LEARNING OUTCOMES**
ENGAGEMENT:	Participants will study the LOs and unpack the SKVs that are imbedded in the Assessment Standards (LO1 & LO3 or LO2 & LO4). Participants will write their answers on a flip chart for reporting back.
TIME ALLOCATION:	70 minutes
RESOURCES:	Worksheet, Flip chart, Koki pens NCS and LPG for Mechanical Technology
BACKGROUND READING:	Subject Statement and Learning Programme Guideline for Mechanical Technology.

INTRODUCTION **(15 minutes)**

State the outcome for this activity, elaborating where necessary
Contextualise – Make participants aware of the fact that in order to develop a Learning Program they should be well acquainted with the Learning Outcomes of MECHANICAL Technology

WRAP-UP (15 minutes)

Highlight all the main content issues
Use any further issues that arose during the engagement and consolidation process to inform what you highlight.

Assessment standard	content (knowledge) Learning Outcome 3	Link to AS of Learning Outcome 1 (Values)
(EXAMPLE) 11.3.1 Demonstrate an understnding of an Occupational Health and Safety (OHS Act.) and regulations where applicable	the impact of the OHS Act on the use of tools and equipment	• respond to basic medical emergencies in context, taking cognisance of health issues such as HIV/AIDS • discussion of human rights issues
11.3.2	Function of purpose-made tools and equipment	
11.3.3	Enhancing the properties of engineering materials	
11.3.4	Applicable terminology	
11.3.5	Uses of permanent joining application	
11.3.6	Effects of forces, moments and torques on engineering components	
11.3.7	Causes of malfunctioning of operating systems.	
11.3.8	Operation of components applicable to mechanical and/ or electronic systems and control	
11.3.9	Operating principles of pumps	

Assessment standard	New content (Skills) Learning Outcome 4	Link to AS of Learning Outcome 2 (Skills)
11.4.1 *(EXAMPLE)* apply all relevant safety measures	the application of safety (personal, hand tools and power tools, in the workplace)	make products according to the design and specify materials, tools and equipment, processes and sequence of manufacturing process
11.4.2	Use and care of hand and power tools	
11.4.3	Application of measures to change the properties of materials for different uses including but not limited to tempering and case hardening	
11.4.4	Working from a given set of intermediate instructions and using production methods such as machining and applying cutting techniques to construct an artefact	
11.4.5	Applying a variety of joining techniques including soldering, oxy-acetylene gas welding and arc welding	
11.4.6	Testing of concepts such as bending moments and stresses	
11.4.7	Monitoring the condition and fault finding of various mechanical systems	
11.4.8	Application of the operating principles of pneumatics and hydraulics including compressed air, gas, steam, water and fuel.	
11.4.9	Identifying and describing the operating principles of pumps	

Activity 5	IMPLICATIONS FOR TEACHING AND LEARNING

ENGAGEMENT: Participants will demonstrate an understanding of the new approach to teaching and learning

TIME ALLOCATION: 2 hrs

RESOURCES: Worksheet, Flip chart, Koki pens, Prestik
NCS and LPG for MECHANICAL Technology

BACKGROUND READING: Subject Statement and Learning Programme Guide for MECHANICAL Technology.

INTRODUCTION:

- What kind of teaching, learning and assessment approach is required to teach, learn and assess the content (i.e. skills, knowledge and values) indicated in Activity number 4.
- What LTSM is required to teach the content imbedded in the Learning Outcomes to achieve the skills, knowledge and values indicated by the Assessment Standards?

INSTRUCTIONS:

- Facilitator allocates two Assessment Standards per group to interact with this activity.
- The worksheet to be completed requires participants to suggest "**why**" and "**how**" the knowledge/skills will be taught with in the new approach to teaching and learning.
- Appoint a scribe to write the answers on a flip chart for reporting back.

DEFINING CONTENT AND CONCEPTS: Mechanical Technology

This guideline document must be read in conjunction with the National Curriculum Statement (NCS) and Learning Programme Guidelines (LPG) for Mechanical Technology.

	Grade 10	Grade 11	Grade 12
What Content / Concepts	**10.1** **Health &Safety:**	**11.1** **Health & Safety:**	**12.1** **Health &Safety:**
	General safety precautions: Industrial housekeeping	Machine specific safety precautions, for example: Drilling-, cutting-, and shearing machines, etc. Handling of gas bottles; Using arc welder	Precautions in relation to testing instruments and equipment, for example: • Brinnel harden testing apparatus and gas analysing; • Compressed air and pressurized vessels; and • Coil-spring compressor.
Why context			
How			
What Content / Concepts	**10.2** **Tools and Equipment**	**11.2** **Tools and Equipment**	**12.2** **Tools and Equipment**
	Use and care of basic hand tools	Use and care of Power Tools and Machinery	Use and care of Testing Instruments and Equipment
Why Context			
How			

What Content / Concepts	**10.3** **Materials**	**11.3** **Materials**	**12.3** **Materials**
	Types, properties and classification of engineering materials on visual appearance and physical tests	Treatment (heat) of metals to enhance their properties with emphasis on tempering and case hardening	Use of materials with enhanced properties in practice; Application of composite materials
Why context	• • • • .		
How	• ; • •		
What Content / Concepts	**10.4** **Appropriate Terminology**	**11.4** **Appropriate Terminology**	**12.4** **Appropriate Terminology**
	Introduction Systéme International units and symbols; South African National Standards (SANS)	Use of lathe, drilling machine and power saws to make an artefact.	Use of milling machines to make an artefact.
	Interpret and use the correct terminology for manufacturing, measuring, and joining systems.		
Why context			
How			
What Content / Concepts	**10.5** **Joining Methods**	**11.5** **Joining Methods**	**12.5** **Joining Methods**
	Types and properties of semi-permanent joints like butt- and lap-joints with pop-rivets, bolts and nuts, etc.	Types and properties of permanent joints for example oxy-acetylene and arc welding	Analysis of joints for possible weld defects; Destructive and non-destructive tests.

Why context	• • •		
How			
What Content / Concepts	**10.6** **Forces**	**11.6** **Forces**	**12.6** **Forces**
	• Graphical representation of triangle and polygon of forces (nature, e.g. struts and ties); and • Testing of concepts such as pressure and torque using gauges, meters and instruments. .	Graphical and basic calculations of shear forces, bending moments and torque	• Determination of stress, strain, compression and tensile tests; • Modulus of Elasticity in different materials.
Why			
How	• • •		
What Content / Concepts	**10.7** **Maintenance**	**11.7** **Maintenance**	**12.7** **Maintenance**
	Preventative measures in reducing wear in moving components	The importance of maintenance procedures in engineering set-up	Diagnostic analysis of malfunction of equipment.

Why			
How	• • • • .		
What Content / Concepts	**10.8** **Systems and Control**	**11.8** **Systems and Control**	**12.8** **Systems and Control**
	Functions of different types of mechanical, hydraulic/pneumatic, electrical- and electronic systems; Experimentation with mechanical- and hydraulic-kits.	The operation of mechanical, hydraulic/pneumatic, electrical- and electronic systems, such as ABS brakes, traction control, air bags, fuel injection, ignition timing, etc. Causes of malfunction of operating systems.	Calculations related to power transmission; Fault finding on operating systems; Apply relevant basic methods of repairing operating systems.
Why context	• •		
How			
What Content / Concepts	**10.9** **Heat Engines**	**11.9** **Pumps**	**12.9** **Turbines**
	Operating principles of 2 & 4 stoke engines (Petrol and Diesel) and steam engines	Operating principles of different kinds of pumps	Operating principles of steam and gas turbines.
Why context	• .	• .	• .
How	• .	•	•

PRESENTATION	LTSM REQUIRED TO TEACH MECHANICAL TECHNOLOGY

ENGAGEMENT: Discussion in plenary.

TIME ALLOCATION: 30 minutes

RESOURCES: Guidelines for selecting LTSM, Power Point presentation

BACKGROUND READING: None

GUIDING CRITERIA FOR SELECTING TEXTBOOKS

1	CONTENT / CONTEXT
1.1	The textbook covers all the Learning Outcomes and the Assessment Standards of the subject.
1.2	The textbook covers the suggested content and this is appropriately sequenced.
1.3	The content is suitably paced and the weighting of LOs is appropriate.
1.4	The content is current and up-to-date.
1.5	The content places learning in context i.e. integrates Assessment Standards within the subject to give learners an authentic learning experience.
1.6	There is clear integration of theory and applied competence.
1.7	The content is sensitive to diversity e.g. culture, religion, gender, etc.
1.8	The textbook provides a variety of meaningful activities for individuals, pairs and groups.
1.9	The level of the content is appropriate for the specific grade.
1.10	The language used and vocabulary are appropriate for the grade and language level.
1.11	Key concepts and terms are clearly defined.
1.12	The language and vocabulary are correct and appropriate for the subject.

2	LEARNING ACTIVITIES & ASSESSMENT
2.1	Learning activities and assessment tasks are derived from LOs and ASs.
2.2	The textbook presents the learner with assessment activities appropriate to the subject.
2.3	Assessment tasks are aligned to the Programme of Assessment as described in the Subject Assessment Guidelines.
2.4	A variety of learning activities and assessment tasks are used.
2.5	Assessment targets learner achievement at different levels of complexity.
2.6	Assessment tasks are clearly formulated and unambiguous.
2.7	Assessment tasks and learning activities provide for daily assessment.
2.8	Assessment tasks allow for expanded opportunities for learners.
2.9	Assessment activities reflect the integration of Assessment Standards.

3	LAYOUT, DESIGN AND OVERALL QUALITY
3.1	The text is structured, using headings and subheadings.
3.2	The font and typeface are clear and easy to read.
3.3	The illustrations and diagrams are clear and relevant, without bias.
3.4	The paper is of a good quality and bound securely[1].
3.5	The textbook has an index with clear reference to chapters and page numbers.

4	TEACHER GUIDE
4.1	Provides clear and systematic guidance on the use of the textbook.
4.2	Provides examples of a subject framework and a work schedule.
4.3	Includes an exemplar assessment plan for the grade.
4.4	Provides memoranda, check lists, rubrics, etc. that match the assessment tasks in the textbook.
4.5	Provides suggested answers / solutions / memoranda / rubrics for learning activities / exercises.

5	MECHANICAL TECHNOLOGY
5.1	Drawings, symbols, measurements, layout are according to the SANS standards.
5.2	The material includes practical examples in the built environment.
5.3	Material includes the latest relevant technologies.
5.4	Illustrations and diagrams have sufficient captions to enable learners to answer questions.
5.5	The textbook provides learners with a framework to conduct projects and practical assessment tasks.
5.6	The volume of content suggested is appropriate for the 4 hours per week allocated to the subject.

6	OTHER MECHANICAL TECHNOLOGY LTSM
6.1	Wall charts e.g. safety, roof truss designs, tools, materials etc
6.2	Videos, digital photo's e.g. construction processes
6.3	Scaled models e.g. roof trusses, placing of doors and windows etc
6.4	Manufacturers building material samples
6.5	Examples of best practice (learner's work etc)
6.6	
6.7	
6.8	
6.9	

Activity 6	IMPLICATIONS FOR ASSESSMENT
ENGAGEMENT:	Participants will demonstrate an understanding of the new approach to assessment in MECHANICAL Technology.
TIME ALLOCATION:	70 minutes
RESOURCES:	Worksheet, Flip chart, Koki pens, Prestik NCS and LPG for MECHANICAL Technology
BACKGROUND READING:	Subject Statement, Learning Programme Guideline and Assessment Guideline for MECHANICAL Technology

INTRODUCTION: (3 minutes)

- Facilitator asks participants to design a tool that would make it easy for the female learner to easily extract the wheel bearing. (No further information should be given.)

WRAP UP (10 minutes)

ACTIVITY 7	PRINCIPLES OF ASSESSMENT
ENGAGEMENT:	Participants will **demonstrate an understanding** of the new approach to assessment in MECHANICAL Technology.
TIME ALLOCATION:	2 hrs
RESOURCES:	Data projector, laptop computer
BACKGROUND READING:	Subject Statement, Learning Programme Guide and Assessment Guideline for MECHANICAL Technology

CHECKLIST TO BE USED WHEN PLANNING FOR ASSESSMENT

NO	ASPECT TO BE CONSIDERED	YES	NO	COMMENT
1	Is the purpose of assessment clear?			
2	Are the criteria to be used to assess performance indicated?			
3	Does the activity allow the learners to engage with the learning outcome(s)?			
4	Does the activity provide for different levels of learner performance?			
5	What methods of assessment are used?			
6	Are the methods used appropriate?			
7	Are the learners involved in the assessment?			
8	Are the results to be recorded?			
9	Is the tool for assessing learners' performance designed effectively?			
10	Is it clear how the result is to be used?			
11	Have all the assessment principles been addressed?			

PRESENTATION	**PERFORMANCE ASSSESSMENT TASK**
ENGAGEMENT:	Participants will understand the nature of the Performance Assessment Task
TIME ALLOCATION:	70 minutes
RESOURCES:	Subject Assessment Guideline document
BACKGROUND READING:	Subject Statement, Learning Programme Guide and Assessment Guideline for Mechanical Technology

ACTIVITY 8	PERFORMANCE ASSSESSMENT TASK
ENGAGEMENT:	Critique and develop Performance Assessment Tasks as well As assessment rubrics
TIME ALLOCATION:	70 minutes
RESOURCES:	Subject Assessment Guideline document
BACKGROUND READING:	Subject Statement, Learning Programme Guide and Assessment Guideline for Mechanical Technology

EXEMPLAR

Mrs Foil drives from home to work every day but one day her car was jerking unable to climb up the hill which is 5 Km from where she works. The car lost power at short intervals until it came to a complete stop. She ultimate had a car towed to nearest garage

- **Plain step by step/ sequentially how would you safely solve Mrs Foil's problem (stating all possible faults) using the following as the guide**.

- Equipment to be used
(3)
- Testers
(4)
- Safety
(5)
- Fault finding method
(5)
- Repair procedure
(8)

[25]

INSTRUCTIONS

- Participants to examine and critique the Practical Assessment Task along with the example of an assessment tool found in the Subject Assessment Guidelines
- Do the task and its related activities address the Assessment Standards of Learning Outcome 2?
- Make suggestions for improvements on the Performance Assessment Task
- In your groups develop a Performance Assessment Task (PAT) suitable for grade 11
- Write your own task on the folio paper provided
- Duplicate the task on the flip chart for feedback purposes
  - Do the task and its related activities address the Assessment Standards of Learning Outcome 2?
  - Input on assessment: How, when, who and what to assess in this task – also make suggestions of other tools that can be used to assess learner performance in the activity and who should carry out the assessment.
  - Make suggestions for improvements on the Performance Assessment Task

ACTIVITY 9	PRINCIPLES OF ASSESSMENT
ENGAGEMENT:	Participants will demonstrate an understanding of the new Approach to assessment in MECHANICAL Technology.
TIME ALLOCATION:	2 hrs
RESOURCES:	Data projector, laptop computer
BACKGROUND READING:	Subject Statement, Learning Programme Guide and Assessment Guideline for MECHANICAL Technology

INTRODUCTION:
A critical review of past examination questions based on Report 550 with the view of converting them to questions suitable for assessing learner performance in a technology context.

FORM OF ACTIVITY: Presentation, interactive, report back and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, Subject Statement, and Learning Programme Guidelines

CONTENT:
- Content, integration and approach to teaching, learning and assessment
- A shift from Technical Subjects to Technology

INSTRUCTIONS:
- Study past examination questions papers based on Report 550 and covert them to suit MECHANICAL Technology context.
- Ensure that the questions are linked to the Assessment Standards. Indicate how these questions can be used for teaching, learning and assessment purposes.
- Indicate how these questions have integrated content from different Learning Outcomes and Assessment Standards

Activity 10	COGNITIVE SKILLS WITH SPECIFIC REFERENCE TO MECHANICAL TECHNOLOGY
ENGAGEMENT:	Explain and illustrate how the Loss and as facilitate cognitive and conceptual development within and across grades
TIME ALLOCATION:	45 minutes
RESOURSES:	Worksheet
METHOD (S):	Presentation, working in pairs

INTRODUCTION (10 minutes)

- At the end of this activity you will be able to understand and identify the levels of Bloom's taxonomy by examining the assessment standards.
- Cognitive strategies are procedures used for discovering knowledge. Benjamin Bloom and his associates developed a classification of learning outcomes, which is still useful for both research and teaching. Bloom's taxonomy pertains to the cognitive objectives of instruction and divides them into several types. These range from goals referring to relatively concrete intellectual skills to ones referring to very abstract thought.

  Bloom classifies learning into the following categories:

  1. **Knowledge** – the ability, on request, to remember, recall, or recognise facts or ideas.
  2. **Comprehension** – the ability to use knowledge that is remembered more or less as it is originally presented and intended to be used.
  3. **Application** – the ability to use general ideas or principles in particular situations.
  4. **Analysis** – the ability to separate the elements of an idea or passage and to examine each one individually.
  5. **Synthesis** – the ability to combine elements into greater structures or wholes.
  6. **Evaluation** – the ability to judge how well ideas and materials satisfy certain criteria.

ENGAGEMENT (25 minutes)

INSTRUCTIONS:

- Participants organise themselves into pairs.
- In the table below, column A contains a list of assessment standards across all grades.
- Participants must identify which level of Bloom's Taxonomy appears to be addressed by the following extracts from the assessment standards.
- Use the verb in the assessment standard to guide you.

	Grade	Assessment Standard (Verbs)	Level on Bloom's Taxonomy
A	10, 11 & 12 Technological Process	**Identify,** **investigate,** **define,** **analyse** problems in a given real life situation	Knowledge Analysis Comprehension Analysis
B		**Design** possible solutions for problems	
C		**Make/improve** products according to the selected design	
D		**Evaluate** the product against the initial design	
E		**Present** assignments by means of a variety of communication media	
F	10	**Identify/ test** properties of materials	
G	11	**Demonstrate** heat treatment of materials	
H	12	**Evaluate** the sustainability of materials	
I	10	**Describe** the function of a tool	
J	11	**Explain** the function of a tool	
K	12	**Use** and maintain specialized tools	
L	10	**Distinguish** between different types of forces	
	11	**Calculate** forces, moments and torques to demonstrate understanding	
	12	**Calculate** stress & strain also apply Young's modulus of elasticity	
M	10	**Demonstrate** an understanding of applicable terminology	
N	11	**Describe** applicable terminology	
O	12	**Apply** terminology in proper context	
P	10	**Describe** the functions of components applicable to systems and control	

Q	11	**Analyse** the operation of the components	
	12	**Use** gear, belts etc. calculations to demonstrate understanding of systems and control	
R	10	**Identify** the effects of lack of maintenance	
S	11	**Evaluate** deterioration of various mechanical components	
T	12	**Suggest** applicable solution	
U	10	**Describe** the operating principles of heat engines	
V	10	**Explain** the uses of different joining methods	
W	11	**Compare** the application of joining materials	
X	12	**Evaluate** and compare the application of joining materials	

TYPES OF QUESTIONS AND COMPLEXITY

The following table gives a summary of the different categories of complexity for standardising the examination papers.

Categories of complexity	Description of categories	Some examples	Weighting
Basic Cognitive skills	Merely assessing the recall of **basic knowledge**	Give labels; List, name, state or identify functions, recognise Concepts, processes, mechanisms, etc.	± 15%
Comprehension	More than recall of facts including **understanding** and **insight** of **routine** and **familiar** content/ situations	Describe or explain concepts, classify, processes, mechanisms; make direct deductions from data given; do calculations, etc.	± 45%
Application	Application of components and systems to new, novel or familiar unfamiliar situations	Interpreting data; explaining adaptations or environmental factors influencing effectiveness; draw flow charts or mind maps to illustrate processes or mechanisms; constructing tables and graphs to organise and present data; drawing diagrams to investigate concepts; communicate findings; applying formulae; solve problems etc.	± 30%
Higher Intellectual Abilities	♦ Analysis of data ♦ Synthesis of data ♦ Evaluation of data against given criteria	Problem solving; Analyse; compare; predict; argue; evaluate Design; develop; formulate	± 10%
Totals			100%

WRAP UP (10 minutes)

Activity 11	Conclusion / Wrap-up (1 hour)

FORM OF ACTIVITY: Presentation and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, Subject Statement, and Learning Programme Guideline

CONTENT:

- Pull all the facts together as discussed in various Learning Outcome and Assessment Standard discussions
- PowerPoint presentation – highlight the subject content and approach

SESSION 3 –
Planning for teaching subjects in the NCS (8 hours)

ACTIVITY 1: Introduction to the planning cycle (½ hour)

FORM OF ACTIVITY: Presentation and discussion

RESOURCES: PowerPoint Presentation, Laptop, and Data Projector

CONTENT:
- Three stages of planning
- Purpose, role-players and duration per stage
- Issues to consider when developing a Learning Programme
- Brief overview of the key activities and development process per stage

ACTIVITY 2: Introduction to the Grade 11 Work Schedule (1 hour)

FORM OF ACTIVITY: Presentation and discussion

RESOURCES: OHP of Grade 11 Work Schedule, OHP Projector, OHP Pens, OHP Sheets, Subject Assessment Guidelines, Learning Programme Guidelines, and Subject Statement

CONTENT:
- Elements of design
- Process of design
  - Integration: What, how and why?
  - Sequencing: What, how and why?
  - Pacing: What, how and why?
  - Suggested assessment tasks: What and why? – will return to this in Session 4
  - LTSM: What and why?

ACTIVITY 3: Critique the Grade 11 Work Schedule (4½ hours)

FORM OF ACTIVITY: Interactive, report back and discussion

RESOURCES: Grade 11 Work Schedule, Subject Statement, Learning Programme Guidelines, and Subject Assessment Guidelines

CONTENT:
- Grade 11 Work Schedule

INSTRUCTIONS:

- Participants study the example of the Grade 11 Work Schedule provided in the LPG and critique it:
  - Does the Work Schedule cover all the Assessment Standards (i.e. content)?
  - Integration: Are the Assessment Standards appropriately linked?
  - Are the Assessment Standards covered in sufficient detail and depth?
  - Pacing: Is the time allocation across the 40 weeks appropriate?
  - Sequencing: Is the content presented in the correct order?
  - Are relevant LTSM listed? If not, list the LTSM required.
  - How can the Work Schedule be improved?

ACTIVITY 4: Report back (1 hour)

FORM OF ACTIVITY: Report back and discussion

RESOURCES: Subject Statement, Learning Programme Guidelines

CONTENT:

- Improved Grade 11 Work Schedule

INSTRUCTIONS:

- Allow different groups to present their improved version of the exemplar Work Schedule for Grade 11
- Engage participants in a discussion after each presentation

ACTIVITY 5: Development of the first Lesson Plan for Grade 11 (1 hour)

FORM OF ACTIVITY: Presentation, interactive, report back and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, Subject Statement, and Learning Programme Guidelines

CONTENT:

- Grade 11 Lesson Plan
  - Elements of design
  - Process of design

INTRODUCTION:

- Lesson Plan: What it is and its duration
- Pointers on deciding on the number of Lesson Plans to be written
- Elements and design of a Lesson Plan
- Teaching method: What and why
- Assessment strategy: Who, when, how and form of assessment
- Expanded opportunities: Inclusive approach to accommodate all learners

INSTRUCTIONS:

- Provide an overview of the elements and the design process of a Lesson Plan
- Engage participants in the development of the first Lesson Plan (Worksheet 1) that will be presented for the first 2-5 weeks of the school year according to the Grade 11 Work Schedule critiqued in Activity 3
- Allow one group to present and then discuss their presentation

SESSION 4 –
Annual assessment plan (8 hours)

ACTIVITY 1: Introduction to assessment in the NCS (¼ hour)

FORM OF ACTIVITY: Presentation and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, and National Protocol on Assessment

CONTENT:
- Approach to assessment: Criteria-driven
- Recording process: Record one global mark / code per task and refer to the Subject Assessment Guidelines for guidance on how to arrive at the final mark for the subject
- Reporting process: 7 codes and percentages
- Portfolios: Teacher and learner

ACTIVITY 2: Programme of Assessment for Grades 10 and 11

FORM OF ACTIVITY: Presentation and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, and Subject Assessment Guidelines

CONTENT:
- Programme of Assessment for Grades 10 and 11 (Section 2 of the Subject Assessment Guidelines): Number of tasks
- Nature of tasks: Forms of assessment suitable to the subject (Section 3 of the Subject Assessment Guidelines) and suitable tools
- Practical Assessment Task (PAT) – if applicable to the subject
- Weighting of tasks for the formal Programme of Assessment and mark allocation

ACTIVITY 3: Development of a Grade 11 annual assessment plan

FORM OF ACTIVITY: Presentation, interactive and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, and Subject Assessment Guidelines

CONTENT:
- Programme of Assessment for Grade 11: Tasks, topics, tools and dates

INSTRUCTIONS:
- Engage participants in the compilation of a Grade 11 annual assessment plan in which they indicate (Worksheet 2):
  - Seven tasks: 2 Tests, 2 exams, 2 other tasks and PAT
  - Topics for each task
  - Assessment tools for each task
  - Date and duration of each task
- Ask participants to revisit the Grade 11 Work Schedule (Session 3: Activity 3) and to align the annual assessment plan for Grade 11 with the assessment tasks listed in the Work Schedule

WORKSHEET 1

SESSION 3 – ACTIVITY 5 **FIRST GRADE 11 LESSON PLAN**

SUBJECT: MECHANICAL TECHNOLOGY **LESSON PLAN:** 1 **DURATION:** 12 hours			**GRADE:** 11 **NO. OF ACTIVITIES:** **WEEK / DATE:** Weeks 1-6	
CONTEXT:				
LINK WITH PREVIOUS LESSON: MECHANICAL TECHNOLOGY			**LINK WITH NEXT LESSON:**	
CORE CONTENT (KSVs): **Replace!**				
	ACTIVITY 1	**ACTIVITY 2**	**ACTIVITY 3**	**Etc.**
LOs & ASs:				
CORE CONTENT:				
DETAIL OF ACTIVITY:				
TEACHING METHOD:				
ASSESSMENT STRATEGY:				
EXPANDED OPPORTUNITIES:				
RESOURCES:				
TEACHER REFLECTION:				

WORKSHEET 2

SESSION 4 - ACTIVITY 3
ANNUAL ASSESSMENT PLAN FOR GRADE 11

SUBJECT: MECHANICAL TECHNOLOGY GRADE: 11 YEAR: 2007

TERM 1	TERM 2	TERM 3	TERM 4
TASK 1	**TASK 3**	**TASK 5**	**TASK 7**
LO(s) and Topic: Form: Date: Duration: Tool:	LO(s) and Topic: Form: Date: Duration: Tool:	LO(s) and Topic: Form: Date: Duration: Tool:	LO(s) and Topic: Form: Date: Duration: Tool:
TASK 2	**TASK 4**		
LO(s) and Topic: Form: Date: Duration: Tool:	LO(s) and Topic: Form: Date: Duration: Tool:		
TASK 6: Practical Assessment Task			
LO(s) and Topic: Date: Duration: Tool(s):			