

Four-Year B.Ed. Course Manual

TVET - METAL AND AUTOMOTIVE TECHNOLOGY 1









The Government of Ghana









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FOREWORD

These Initial Teacher Education course manuals were developed by a team consisting of members from Colleges of Education and four universities namely the University of Ghana, Kwame Nkrumah University of Science and Technology, University of Education, Winneba, and University for Development Studies. This team was originally constituted by the National Council for Tertiary Education (now the Ghana Tertiary Education Commission) in 2019 to support the delivery of the new B.Ed. curriculum with assistance from T-TEL and UK Aid. The revision, finalization and printing of these manuals took place in 2021 with support from T-TEL and Mastercard Foundation.

The course manuals have been produced for use as general guides for the delivery of the new four-year B.Ed. curriculum in Colleges of Education in collaboration with their affiliated universities. They are designed to support student teachers, tutors and lecturers in delivering a complete B.Ed. course for training student teachers which meet the requirements of the National Teachers' Standards, enabling them to teach effectively in basic schools.

The first section of the manuals is focused on the course information and vision for the B.Ed. curriculum. The second section presents the course details, goal for the subject or learning area, course description, key contextual factors as well as core and transferable skills and cross-cutting issues, including equity and inclusion. The third section is a list of course learning outcomes and their related learning indicators. The fourth section presents the course content which is broken down into units for each week, the topic and sub-strands and their related teaching and learning activities to achieve the learning outcomes and the teaching and learning strategies. This is followed by course assessment components in section five. Each manual contains a list of required reading and references as well as teaching and learning resources. The final section presents course related professional development for tutors and lecturers to be able to use each section of the manual.

Field instructions to guide Supported Teaching in School are integrated into the course manuals to provide the student teacher with guidance in developing teaching throughout the entire period of study to be able to meet the requirements of the National Teachers' Standards (NTS) and the National Teacher Education Curriculum Framework (NTECF). To ensure maximum benefit the course manuals should be used in addition to other resources such as the NTS, NTCEF, National Teacher Education & Assessment Policy and the National Teacher Education Gender Equality and Social Inclusion (GESI) Strategy and Action Plan. This will help to ensure that student teachers learning is integrated within the wider teacher education policy framework.

Professor Mohammed Salifu Director General, Ghana Tertiary Education Commission

ACKNOWLEDGEMENTS

The course manuals were developed through the collaborative efforts of a team of individuals from Colleges of Education, University of Ghana, Kwame Nkrumah University of Science and Technology, University of Education, Winneba and University for Development Studies. They were produced in association with the Ghana Tertiary Education Commission of the Ministry of Education, Ghana.

A participatory team approach was used to produce these sets of resources for tutors/lecturers, mentors and student teachers. We are grateful to the specialists who contributed their knowledge and expertise.

Special thanks to Professor Jophus Anamuah-Mensah - T-TEL Key Advisor, Dr. Eric Daniel Ananga T-TEL Key Advisor for Curriculum reform and Beatrice Noble-Rogers who provided key editorial, review and content input and facilitated the process of drafting and finalising the course manual.

Patricia Appiah-Boateng and Gameli Samuel Hahomene, served as typesetting and formatting coordinators and designed and produced the illustrations, tables and other graphics which appear in the pages. They spent time and effort designing and redesigning the graphic layout and producing the camera-ready copies resulting in a set of materials that are easy to use, read and reference.

Thanks also goes to all T-Tel staff members who worked to support production of these course manuals, particularly Beryl Opong-Agyei and Gideon Okai. Their frankness and co-operative attitude complimented the team is approach used to produce these manual.

We are indebted to the Ministry of Education and the Ghana Tertiary Education Commission (GTEC) for the general support and specific helpful advice provided during production of the course manuals. Recognition and thanks must go to Chief Technical Advisor for T-TEL and Policy Advisor to the National Education Reform Secretariat, Akwasi Addae-Boahene, Prof. Mohammed Salifu, the Director General of GTEC and Mr. Jerry Sarfo the coordinator for the colleges of education, who in diverse ways supported during the course manual writing workshops.

In addition to all the staff who participated visibly in the development of these materials we would like to acknowledge all those people from the many colleges of education and universities in which we have worked and who have directly or indirectly, shared their views on the curriculum with us.

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INTRODUCTION TO COURSE MANUALS

Welcome to this B.Ed. Course manual.

Following the accreditation of the B.Ed. by the national accreditation Board with its recognition as a world class teacher education curriculum, the decision was taken to support effective implementation through the development of course manuals. the course manuals provide tutors and lecturers with the materials necessary to support teaching each of the B.Ed. courses. The manuals adhere directly to, and emphasise, the principles and standards set out in the NTS, NTECF and in the B.Ed. and will help ensure operationalising the Government's teacher education reform Policy.

The manuals serve the following purposes:

- they are the key educational agreements between the training institution and the student teachers. In this way student teachers know what the expectations are for them and for the training they will receive.
- they lay out the course outcomes, content, strategies, and assessment, thereby providing direction to and consistency in training and B.Ed. implementation among tutors across the country.
- they are explicit documents that provide other institutions with information on which to base transfer/ articulation decisions.

Specifically, they also:

- support coherent lesson planning and teaching which will enable student teachers to achieve the NTS and become good teachers who ensure all pupils' learning whilst offering tutors the flexibility for adaptation for local needs and contexts.
- Provide a lesson by lesson overview of the course, building on and developing the material in the course specifications.
- Inform tutors, student teachers and others working with student teachers about:
 - 1. What is to be taught and why.
 - 2. how it can be taught.
 - 3. how it should be assessed.
- Provide opportunities for student teachers to develop and apply knowledge during supported teaching in school, creating a strong bond between learning in school and in the training institution.
- Reflect the stage of student teacher development, set out in the model for progress across the four years of the B.Ed.
- Can be used as self-study tools by student teachers.
- Ensure that all information necessary to inform teacher training is in one place (serves as reference document).
- The manuals are the basis of the codes and university professional development sessions to ensure Principals, tutors, lecturers and heads of department are fully familiar with the details of: courses, outcomes, content, approaches, assessments and lessons.

Who are course manuals for:

- College of Education Tutors
- Teacher Education University Lecturers
- Student Teachers
- Mentors and Lead Mentors
- All Those with An Interested In Teacher Education.

USING THIS MANUAL

Writers of the manuals engaged widely with colleagues in each subject area at each stage of development. Besides, writers envisaged themselves in varied contexts as they wrote, to suggest methodologies and strategies for teaching the strands which would ensure student teachers are enabled to achieve the learning outcomes. In view of our commitment to creativity, problem solving, collaboration and to lifelong learning, we expect that individual tutors will "own" their manuals and become user-developers. lessons in the manuals will be strands for weekly Pd meetings where tutors/lecturers will situate the lessons in the contexts of their colleges and their student teachers, to maximize the benefits.

It is also expected that tutors will model the best pedagogic practices for student teachers. Key among such practices is the communication of the importance of having a personal teaching philosophy. We expect that tutors and lecturers will explicitly communicate their personal teaching philosophies to their student teachers during the first meeting of every course. in preparation for this, we suggest you set out your personal teaching philosophy and how it will be demonstrated in your teaching using, or adapting, the sample sentence introductions below.

My teaching philosophy is

In view of this philosophy, I will facilitate this course by/through

Course Manual Writing Guide

Resources for Course Manual Writing

- Soft copies of the CWG, New Four-Year B.Ed. Curriculum introduction
- Soft and hard copies of the course specifications for the subject for year one and two
- Soft and hard Course Manual Writing Guide (CMWG)
- Relevant subject texts

Target Audience

- College of Education Tutors
- Teacher Education University Lecturers
- Student Teachers
- Mentors

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The purpose of course manuals

- To provide a lesson by lesson overview of the course, building on, adapting and developing the material in the course specifications
- To provide a resource to support professional development sessions for tutors/lecturers on how to plan for and teach courses from the New Four-Year B.Ed. Curriculum
 - To inform tutors /lecturers, student teachers and others working with student teachers about:
 - what is to be taught and why
 - how it can be taught
 - how it should be assessed
- To support consistency in the implementation of the New Four-Year B.Ed. across institutions who train teachers
- To ensure that all **training** information on skills, processes, and other information necessary to perform the teaching task are together in one place.

B.Ed.

- 1. They are written with the learner, the student teacher, in mind: what they will *be able* to cope with and only include what student teachers need to know, understand, be able to do and be as a basic school teacher
- 2. They take in to consideration the learner's, the student teacher's, context and possible barriers to, and enablers for, learning
- 3. They are written with the tutors /lecturers who are going to teach the course in mind. Tutors must be able to adapt and develop the plans in course manuals to fit the context they are teaching in and to support their teaching
- 4. They are aligned to the key principles and practices of the Teacher Education Reform Policy: the NTS, the NTECF and the New Four-Year B.Ed.
- 5. They are written to provide opportunities for student teachers to develop and apply knowledge during supported teaching in school
- 6. They are written to reflect the stage of student teacher development, set out in the model for progress in the New Four-Year B.Ed.
- 7. They are written to support progress in student teacher learning, including building on prior learning from the previous programme or course/s and supporting progress to the next course.
- 8. They are to be used as self-study tools.
- 9. They are written to have the following characteristics: easy to read; uses active voice and avoids jargon; uses bullet points to offset text; uses images

What a teacher educator needs to know, understand and use to inform what they do

- The aims and structure of the education system and Education strategic Plan
- The Basic School Curriculum
- The Inclusion Policy
- The teacher education system: The National Teacher's Standards, the vision for teacher education and the core principles of the New Four-Year B.Ed.
- Andragogy, effective methods and practices for teaching adult learners
- Assessment Literacy. Assessment for, of and as learning -Educative Assessment

Guidance for completing the course manual writing proforma: two sections

A. Course Information

Title Page

i.

Metal and Automotive Technology 1

ii. The vision for the New Four-Year B.Ed. Curriculum

"To transform initial teacher education and train highly qualified, motivated new teachers who are effective, engaging and fully prepared to teach the basic school curriculum and so improve the learning outcomes and life chances of all learners they teach as set out in the National Teachers' Standards. In doing this to instil in new teachers the Nation's core values of

honesty, integ	rity, cre	ativity and r	espoi	nsible citizensl	hip and to achieve	e inclusive, equitable, high quality education for	all
learners. "							
III. (Lourse D	etails: as in	cours	se specification	n unless importan	nt reason why hot	
Pre-	IVEI	i ve i relateu subjects from wASSCE/National Certificate II (Technical)					
requisite/s							
CO-							
Course Level	200	Course	1 1	Cradit	2		
Course Level	200	Code		Value	3		
Table of conte	l ents	Coue	1 1	Value			
Fach manual v	will inclu	de:					
1. The g	oal for t	he subject c	or lea	rning area			
2. Cours	se descri	iption		0 * * *			
3. Key c	ontextu	al factors					
4. Core	and cros	ss cutting iss	sues, i	including equi	ty and inclusion		
5. Cours	se Learn	ing outcome	es				
6. Cours	se conte	nt					
7. Teach	ning and	learning str	ategi	es			
8. Cours	se Asses	sment comp	oner	its			
9. Read	ing and	reference lis	st				
10. Hand	outs, po	wer points a	and o	ther resources	s for lessons		
11. Plans	for each	1 lesson in tl	he se	mester			
A. Cours	se inforn	nation		a. A 40.0			
I. GOOI	jor the s	Tachnology	urnin vic do	g Area	aduce the student	t togehow to the concenter foundations and histo	
Wetal and Aut	comotive	? Tecnnology	/is de	signed to intro	bauce the studen	t teacher to the concepts, foundations and histo	ory of
the Mechanic	al engin		stry v sf rol		nd materials in t	the engineering industry and to be introduce	ident
foundational r	maninul:	ative proces		kills in the eng	ineering industry	,	20 LO
	ontextu	al factors	303/3	kins in the eng	incering industry	·	
The education	n systen	n has focus	ed o	n preparing s	tudents for exan	minations instead of helping them to develor	the
relevant indus	try and	entreprenei	urial s	kills which cou	uld enable them f	function successfully in life.	/ the
3. Cours	se Descri	iption					
This course is	designe	ed to introd	luce 1	the student te	eacher to the co	ncepts, foundations and history of the engine	ering
industry which	n dates k	back to the r	nedie	eval era. The co	ourse is also inter	nded for the student teacher to explore the natu	ire of
relevant tools	and ma	aterials in t	he er	ngineering ind	lustry. Through g	guided demonstrations and simulations the stu	ident
teacher will b	e intro	duced to fo	unda	tional manipu	lative processes/	/skills in the metal and automotive industries.	. The
topics involve	d the Pl	nilosophy ar	nd his	story of engine	eering, philosoph	nies, concepts and safe working environment ir	n the
metal and aut	omotive	industries.	۲now	ledge in perso	nalsafety and saf	fe working environment in the metaland autom	otive
industriesand knowledge in Materials safety i.estorage, handling, transporting and disposal are covered. The course also							
involvethe relevantknowledge of Materials used in the Metal and Automotive Industries–Metals: Ferrous Metals (Cast iron							
and Steel), N	and Steel), Non-ferrous metal, Alloys, Properties (mechanical, Physicaland Chemical), Methods of identifying metals						
andskills in Ma	andskills in Manufacturing Processes of Plastics.						
These areas	These areas will provide the student teacher with the understanding of various metal and automotive concepts,					epts,	
toundations a	toundations and historical perspective. It is also to provide the basis for efficient and effective knowledge and appropriate						
utilization of	for col	acting mot	elate	u materials. A	Additionally, stut	bent teachers will have firm knowledge base	
nrepares the	student	teacher for	wor	k (practitione	r) by equipping t	him/her with the knowledge and skills in proh	aisu Jem-
solving critica	al thinki	ng and crea	tivity	· The student	teacher is evne	interview with the knowledge and skins in pro-	r and
develop respo	nsihle c	itizenshin te	n ann	reciates the c	lignity of work a	nd contribute to sustainable society. Thus, the	, and The
course will be	e delive	red using t	he fo	ollowing meth	ods. Discussion	presentations (group/individual) seminar pr	oiect
work/practica	l work. c	lemonstratio	ons. t	prainstorming.	simulation, and i	industrial visits. The following assessment mode	s will
be used: Exam	be used: Examination, tests, project work, class assignments and presentations, and portfolio						
As part of the	e course	requireme	nts, t	he student te	eachers will be re	equired to undertake various projects and pro	duce
artifacts. In the process of designing and producing the artifacts, the student teacher will be introduced to relevant issues							
of equity and	of equity and inclusivity within the industry as well as the concept of greening TVET by way of considering recycling, re-						
designing or re	e-using v	waste.			-		
As part of dev	veloping	teaching, t	he st	udent teacher	s are also expose	ed to observation in the school environment w	/here
they are to re	eflect or	n their prof	essio	nal practice b	y engaging posit	tively with colleagues, mentors, learners and c	other
stakeholders	and buil	d a portfoli	io ref	lecting a bett	er understanding	g of the JHS learner and the learning environ	ment
showing grow	ing com	prehension	and a	application of	the concepts of i	inclusivity, equity, access for all learners irrespe	ctive
of ability, gene	of ability, gender or socio-economic status and cultural background. During such reflections, student teachers are to relate						

their knowledge acquired in metals Technology to the school environment. The course is designed to meet the following NTS and NTECF requirements: NTS pg. 14,c, j, 24e, f, 26 j, NTECF pg. 16, 29,33,38.

Core and transferable skills and cross cutting issues, including equity and inclusion

Core and transferable skills:Critical thinking, problem solving, communication skills, and use of ICT **Cross-cutting issues**:

This can be found in the course specification. Which core and transferable skills or cross cutting issues will be applied or developed through this course? This needs to be made explicit to student teachers. Are there specific issues to do with equity and inclusion which must be addressed so that all student teachers can fully take part? For example, issues related to gender and mathematics or science.

4. Course Learning Outcomes	5. Learning indicators
By the end of the course, Students teachers will be	
able to	
CLO.1 Demonstrate knowledge and understanding in	1Produce a report on the relevance foundational history and
the relevant foundational history, philosophies,	philosophies inthe metal and automotiveindustries.
concepts and Safe Working environment in the metal	1.2 Prepare a report showing the concepts and trends in
and automotive industries	the metal and automotive industries using Internet resources.
	1.3 Use ICT resources (video)to discuss the modern developments
	and challenges facing the metal and
	automotive industries
CLO 2. Exhibit knowledge and skills in the processes	2.1 Make a portfolio on the training materials used in the metal
and proper use of training materials in the metal and	and automotive industries
automotive industries. (NTS pg. 10,	
NTECF pg. 29).	2.2 Prepare a project work involving the use of materials in the
	Metal and Automotive industries
CLO.3 Demonstrate knowledge and skills in the	3.1 Use and operate tools, equipment and machines in
processes and proper use of tools, equipment and	the metal and automotive industries.
machines in the metal and automotive industries.	
(NTS pg. 10, NTECF pg. 29)	
CLO 4. Exhibit knowledge and	4.1 Use simulations and pre-video recordings from Internet
understanding of the operation of Internal	source to demonstrate and discuss the operation of engines.
Combustion Engines.	
	4.2 Discuss and produce a report comparing compression and
	spark ignition engines

6. Course content

In the course specification. This should provide an outline of the academic and / or practical content of the course. It should be clear how this content relates to the achievement of the intended learning outcomes. The name of each unit in the course should be *briefly* set out – the name should make it clear what the unit is about.

	5,7		
Unit	Торіс	Sub-topic (If any)	Teaching and learning activities to achieve
			the learning outcome
1	Philosophy and history	1.Self-Introduction(If Tutor is	Through face-to-face interaction,
	of engineering,	new to the Class)	Tutor/lecturer and student-teachers
	philosophies, concepts and safe	,	introduce themselves
	working	2 Introduction to the Metal	
	anvironment in the	And Automative Technology I	Tutor/Lacturer initiates discussion on the
		And Automotive Technology I	rutor/Lecturer initiates discussion on the
	metal and automotive	Manual	course manual emphasizing on the
	industries.		objectives, learning outcomes, course
		3.Philosophy of the metal	content and reference material
		and automotive	
		industries.	Tutor facilitates student teachers revision of
			previous knowledge on objects made from
		4 History of metal	metals and also types of vehicles they travel
		Production	
		Production	with.
		5.Modern developments and	
		challenges facing the metal	
		and automotive industries	
2		Metals	Tutor facilitates student teachers revision of
	Materials used in the	a. Ferrous Metals (Cast	previous knowledge on Materials used in the
	Metal and Automotive	iron and Steel)	Metal and Automotive Industries
	Industries	h Non-ferrous metal	
	וועעטנווכט	D. NOIFICHOUS INCLAI	1

		c. Alloys	Tutor usesInteractive lecture to make brief				
		d. Properties	presentation on Ferrous Metals (Cast				
		(mechanical, Physical and	iron and Steel)				
		Chemical)	OR				
		e. Methods of identifying	Tutor will use pre- video recordings from				
		metals	sources (YouTube, Khan Academy, Coursera,				
			Udemy, MOOCs) toDiscuss the production				
			processes of ferrous metals (pig iron, cast				
			iron andsteel)				
3		Identification and uses of	Tutor usesInteractive lecture to make brief				
	Tools, Machine; and	1.measuring tools	presentation Identification of				
	Metal Work Joining	2. marking out tools	Tools/Equipment- Measuring,				
	Processes	3. Holding tools	Marking and Holding				
		4.Striking tools	OR				
		5.Cutting tools	Tutor will use pre- video recordings from				
		o Files	sources (YouTube, Khan Academy, Coursera,				
		o Chisels	Udemy, MOOCs) to Discuss and present				
		o Hacksaws	manipulative				
		6.Finishing tools and	skills on				
		Processes.	Measuring,				
		Classification of metal	Marking, Holding and				
		work joining processes	StrikingTools/Equipment				
		(permanent and					
		temporary)					
		 Riveting, Soldering and 					
		Brazing processes and					
		equipment					
4		1. History of engines.	Tutor facilitates student teachers revision of				
	Operation of Internal	2.Layout of an engine.	previous knowledge on Engines of Vehicles.				
	Combustion Engines	3. Type of Internal	Tutor uses Interactive lecture to make brief				
		Combustion engines.	presentation on the History of engines.				
		Spark Ignition Engines	OB				
		Compression (Diesel)	Tutor will use pre- video recordings from				
		Engines	sources (YouTube, Khan Academy, Coursera.				
			Udemy, MOOCs) to discuss History of				
		Principles of operating	engines				
		Internal Combustion Engines.	-				
7.	Course Assessment Components	· · · · · · · · · · · · · · · · · · ·					
In the	In the course specification. The NTS and the NTECF require a move away from largely examination-based assessment to						

In the course specification. The NTS and the NTECF require a move away from largely examination-based assessment to strategies to enable assessment of student teachers' skills, knowledge and understanding against the learning outcomes and through these the against the NTS

- There should be a maximum of 3 assessment components per 3 credit-course; to avoid over loading student and tutors/lecturers
- The learning outcomes to be assessed by each assessment component should be identified.
- Each assessment component should explicitly reference the NTS or aspects of the NTS it will assess.
- Each assessment component should include:
 - The category or type, for example: written, coursework or practical, teaching, examination, collaborative project or presentation, poster, TLM
 - \circ ~ The type of assessment: of, for and /or as.
 - \circ An indication of the size of each assessment component (e.g. duration of exams, word limit of written submissions, length of presentations; whether presentations have an individual or group etc.).
 - The weighting of each assessment component should be expressed as a % of total course mark (overall in each course: 60% continuous assessment of course work, 40% examination of course work).

Each assessment should be manageable and relevant to supporting the student teachers' development.

The guidance on assessing student teachers from the NTS, the NTECF the CWG and the New Four Year B.Ed. should be used.

Summary of Assessment Methods

Component 1: Examination Assessment Type: Assessment of Learning

Category of Assessment: Written Examination

Maximum Duration: 3 hours

Students teachers are assessed by summative examination on:

- The relevant foundational history, philosophy in Metal and Automotive Technology.
- Materials used in the Metal and Automotive Industries
- Tools, Machine; and Metal Work Joining Processes.
- Operation of Internal Combustion Engines.

Learning Outcomes Assessed: CLO 2, CLO3, CLO 4& CLO5; NTS pg. 14(c & j); pg. 24 (e & f); pg. 26 (j)

Weighting: 40%

Component 2: Continuous Assessment 1

Assessment Type: Assessment for and as Learning

Category of Assessment:

Student teachers assessed through **Presentations** and **Reports**on:

- The relevant foundational history, philosophy in Metal and Automotive industry.
- Materials used in the Metal and Automotive Industries
- Tools, Machine; and Metal Work Joining Processes.

Learning Outcomes Assessed: CLO 1; CLO 2 & CLO 3; NTS pg. 14 (b) Weighting: 30%

Component 3: Continuous Assessment 2

Student teachers assessed through Portfolio and Project Work on:

- The relevant foundational history, philosophy in Metal and Automotive Technology.
- Materials used in the Metal and Automotive Industries
- Tools, Machine; and Metal Work Joining Processes.
- Operation of Internal Combustion Engines.

Learning Outcomes Assessed: CLO 1; CLO 2 & CLO 3; NTS pg. 12 (a, b & c); pg. 13 (c); pg. 14 (b) Weighting: 30%

8. Teaching and learning strategies

Detail in this section should show how the total learning hours will be used to achieve the intended learning outcomes, to provide a guide to the teaching and learning strategies to be used. Each teaching strategy should be selected as most appropriate to achieving the learning outcomes. This may include team teaching or additional tutors. As stated in the B.Ed. experiential learning and interactive teaching approaches are encouraged

Discussion, presentations (group/individual), seminar, project work/practical work, demonstrations, brainstorming, simulation, and industrial visits

9. Required Reading and reference list

One or two compulsory texts which must be made available to the student teachers and a SHORT list of 5 relevant references. These lists should be annotated with the key value of each text. Use APA style of writing.

Amoakohene, S.K. et al (1998). *Technical skills and drawing for teacher training Book 2 (Tools and processes and methodology*). Accra: Unimaxin association with Macmillan Educ. Ltd. Cambridge University Press.

Callister, W.D and Rethwisch, D.G (2013). Materials Science and Engineering: An Introduction 9th Edition. Wiley.

Denton, T. (2014). Automobile electrical and electronic systems. Amsterdam: Butter-worth-Heinemann.

Dolan, J.A. (1979). Motor vehicle technology and practical work (Parts 1 and 2). Hong Kong: Heinemann Educational Books Ltd.

10. Teaching and Learning Resources

Instructional resources required to support learning during the course e.g.: TLMs, lab and workshop equipment, videos, projectors

Basic Metal and Automotive tools and equipment, metal materials (Metals- a. Ferrous Metals (Cast iron and Steel), b. Non-ferrous metal, c. Alloys,

d. Properties (mechanical, Physicaland Chemical)

Course related professional development for tutors/ lecturers

This is not included the course manual but professional development needs must be identified to ensure all tutors / lecturers are prepared to teach the course identify any specific topics or issues which may be challenging for tutors / lecturers.

Year of B.Ed.	2	Semester	1	Place of lesson in semester	1234567	8 9 10 11 12
Title of Lesson		Philosophy	and his	tory of engineering, philosophies,	Lesson	180 minutes

		This sophy and instally of engineering, principle, in the source of the					100 minutes		
		concepts and safe working environment in the metal Duration							
		and auto	motive indu	istries.					
Les	son description	The lesson is to enable the student teacher to acquire the requisite knowledge and understanding of the skills in themetal and automotive industries. The student teacher will be introduced to the philosophy and history of engineering (metal and automotive technologies), safety and safe working environment in metaland automotive industries. This first lesson introduces student to the course learning outcomes and three 3 assessment components of the course.							
Pre	vious student teacher	Student-	teachers are	2:					
kno	wledge, prior learning	•	Familiar wit	h obiects m	ade from met	als			
(ass	sumed)	•	They also tr	avel in vehi	cles.				
Pos the	sible barriers to learning in lesson								
Les	son Delivery – chosen to	Face-	Practical	Work-	Seminars	Independe	ent	e-learning	Practicum
sup	port students in achieving	to-	Activity	Based		Study		opportunit	1
the	outcomes	face₽		Leaning				ies	
								\square	
of of the	delivery chosen to support dent teachers in achieving learning outcomes.	historyof engineering, philosophies, concepts and safe working environment in the metal and automotive industries. Use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss, prepare and present a Portfolio on the Philosophy and history of engineering, philosophies, concepts and safe working environment in the metal and automotive industries.							
•	Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. Write in full aspects of the NTS addressed	The purpose of this lesson is to introduce student teachers to thePhilosophy and history of engineering, philosophies, concepts and safe workingenvironment in the metal and automotive industries.							
•	Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for	Learning Outcome	es	Learning Ind	dicators	Ide - c inc div ad	entify ore a clusiv versit dress	y which cross- ind transferab rity, equity and ty. How will th sed or develop	cutting issues le skills, d addressing ese be bed.
	each learning outcome	CLO.1 Demonst knowled understa the relev foundati history, philosop concepts Safe Wol environn	trate ge and inding in vant onal hies, and rking nent in	1Produce a relevance f history and the metal an industries. 1.2 Prepare the concep the metal an industries u resources. 1.3 Use ICT	report on the oundational philosophies in a automotive a report show ts and trends nd automotive sing Internet resources (vic	in • • ving in •	crit dive infc	ical thinking ersity and inclu prmation litera	ısivity, cy,

	the metal and automotive industries.	to discuss the mo developments an facing the metal	odern d challenges and tries	
Торіс	Topic Sub-topic	Stage/Time	Teaching and learnin learning outcomes: de selected. Teacher led, c independent study	ng activities to achieve pending on delivery mode collaborative group work or
	1.Self- Introduction(If Tutor is new to	Stage 1 - 30 min	Teacher Activity .Self-Introduction(If Tutor is new to the Class)	Student Activity Self-Introduction(If Tutor is new to the Class) Student-teachers do self-
Philosophy and history	the Class)		interaction, Tutor and student-teachers introduce themselves	student-teachers)
of engineering, philosophies, concepts and safe working environment in the metal and automotive industries.	Introduction to the Metal And AutomotiveTech nology I Manual		Course Manual Introduction Tutor initiates discussion on the course manual emphasizing on the objectives, learning outcomes, course content and reference material	Course Manual Introduction Student-teachers discuss the manual and what they expect to learn after studying the course
	Philosophy of the metal and automotive		Lesson Introduction Tutor facilitates student teachers revision of previous knowledge onobjects made from metals and also types of vehicles they travel with.	Lesson Introduction Student teachers answer question and do brief discussions.
	industries. History of metal Production	Stage 2 - 50 min	Interactive Lecture Tutor usesInteractive lecture to make brief presentation on the Philosophy of the metal and automotive industries.	Interactive Lecture Student teachers listens, contribute to discussions and write down important points.
	.Modern developmet and		Discussion& Video Presentation Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discussPhilosophy of the metal and automotive Industries	Discussion Student teachers engage in discussions and do power point presentation onPhilosophy of the metal and automotive Industries
		Stage 3 - 40 min	Discussiom& Video Presentation Tutor will use pre-	Discussiom& Video Presentation Student teachers prepare

	challenges facing the metal and automotive industries	Stage 4 - 50 min	video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discussHistory of metal Production Group Discussion Tutor guide students in groups to discuss Modern developments and challenges facing the metal and automotive industries	and present a report on History of metal production. Group Discussion Student teachers engage in discussions and do PowerPoint presentation on the Modern developments and challenges facing the metal and automotive industries
		Stage 5 - 10 min	Closure Reflection of the salient parts of the lesson and Closure.	Closure Students reflect onthe Philosophy and history of engineering, philosophies, concepts and safe working environment in the metal and automotive industries
Lesson assessments – evaluation of learning:of, for and as learning within the lesson (linking to learning outcomes)	Component 1 Asse Category of Asses 1. Philosophy of th 2. History of metal 3. Modern develop Learning Outcome Weighting (40%)	ssment type: Asse sment: quiz e metal and autom production oments and challen s assessed:LO1	ssment of Learning otiveindustries. ges facing the metal and a	automotive industries
	Component 2 Assessment Type: Component 2; Com Category of Assess Student teachers a Presentations such 1. Philosophy of th 2. History of metal 3. Modern develop	Assessment for an itinuous Assessment iment: ssessed through ok as Power-Point pro- e metal and autom production ments and challen	d as Learning nt 1 oservation and contributio esentations, as well as po otiveindustries. ges facing the metal and a	ons to class discussion, Oral rtfolio on the lesson: automotive industries
Teaching Learning Resources	Weighting (60%)	antons or PCs)		
. caening rearring resources	 Interactive bo Internet facili 	bards ty		
Required Text (core)	Callister, W.D and Introductio Denton, T. (2014). worth-Hein Dolan, J.A. (1979). Kong: Hein	Rethwisch, D.G (20 on 9th Edition.Wile Automobile electri- nemann. Motor vehicle tech nemannEducational	13). Materials Science and y. cal and electronic systems nology and practical work I Books Ltd.	d Engineering: An 5. Amsterdam: Butter- 5 (Parts 1 and 2). Hong
	Publicatior	10akonene, S.K. (19 18.		gy. Lunuun, Machillan

Additional Reading List	Gill, P. S. (2011). A textbook of automobile engineering (vol. 1).New Delhi: S. K.
	Katari&Sons.
	Hillier, V.A.W. (1991). Fundamentals of motor vehicle technology (4th ed.). Musselburgh:
	Stanley Thornes Ltd.
	Jones, D. R.H and Ashby, M.F (2011). Engineering Materials 1, Fourth Edition: An
	Introduction to Properties, Applications and Design 4th Edition, Butterworth-Heinemann
CPD Needs	1. Documentary Analysis and discussion on Philosophy of the metal and automotive
	industries, History of metal production and Modern developments and
	challenges facing the metal and automotive industries
	2. Manipulating of Interactive Board
	3. Organising Class / group Discussions (THEME 3 ,5)
	 Portfolio Building onModern developments and challenges facing the metal and automotive industries

Year of B.Ed. 2			Semester 1 Place of lesson in semester					1 2 3 4 5 6 7 8 9 10 11 12						
				I										
Title of Lesson			Philosoph safe work	Philosophy and history of engineering, philosophies, concepts and safe working environment in the metal and automotive industries.Lesson Duration180 minutes										
Les	son descriptio	'n	The lesso working e	n is to enab environment	le the stude t in the met	nt teacher to ga al and automo	ain knowledge in otive industries,	personalsafety	and safe	2				
Pre	vious student	teacher	Student-t	eachers are	familiar wit	:h:	,							
kno	owledge, prior	learning	1.Philoso	phy of the n	netal and au	itomotiveindus [.]	tries.							
(as	sumed)		2. History	of metal pr	oduction									
			3. Moder	n developm	ents and ch	allenges facing	the metal and au	tomotive indust	tries					
Doc	sible barriers	+o												
lea	rning in the les	sson												
Les	son Delivery –	chosen	Face-	Practical	Work-	Seminars	Independent	e-learning	Practi	icum				
to s	support studer	nts in	to-	Activity	Based		Study	opportuniti						
ach	ieving the out	comes	face⊠		Leaning			es						
		· ·												
Les	son Delivery	- main	Use Inter	active lectu	re to make i	oriet presentati	on on Personal s	atety, kshop prosticos						
sun	nort student	teachers	and ethic	s in the Met	al and Auto	motive industri	inggiene and wor	kshop practices						
in	achieving the	e learning		s in the wet										
out	comes.	Ū	Use pre-	video recore	dings from s	ources (YouTub	oe, Khan Academ	y, Coursera, Ud	emy, M	OOCs)				
			to discuss	to discuss, prepare and present a Report on Personal safety,										
			Workshoprequirements and safety, Workshop hygiene and Workshop practices											
			and ethics in the Metal and Automotive industries.											
•	Purpose for t	he lesson.	The purp	ose of this le	esson is to ir	ntroduce stude	nt teachers toPer	sonal safety,						
	what you	want the	Workshop requirements and safety, Workshop hygiene and Workshop practices											
	students to	achieve,	and ethics in the Metal and Automotive industries.											
	serves as ba	sis for the												
	learning out	comes. An												
	expanded v	ersion of												
•	Write in full													
 write in full aspects of the NTS addressed 														
					r									
•	Learning Out	come for						Identify	which o	cross-				
	the lesson, p	om the						and tran	issues - i sferabli					
course specification								skills, in	clusivity	C /,				
•	Learning indi	cators for	Learning	Outcomes		Learning Indica	ators	equity a	nd					
each learning outcome								address	ing dive	rsity.				
								How wi	ll these	be				
								address	ed or					
				monstrate		1 / Dropara a r	enort on	develop	ea.	ling				
			knowledg	rionstrate	rstanding	environment r	equirements		rsity and	ч				
			in the rel	evant found	ational	for thelearning	g/school	inclu	i sity and isivity.	u				
			history, p	hilosophies,		setting.								
			concepts	and Safe W	orking									
			environm	ent in the m	netal and									
			automoti	ve industrie	s.									

Topic Philosophy and history	Topic Sub-topic	Stage/Time	Teaching and learning activitiesto achieve learning outcomes: depending on delivery mode selected. Teacher led,collaborative group work or independent study			
of engineering, philosophies, concepts and			Teacher Activity	Student Activity		
safe working		Stage 1 - 10	Lesson Introduction	Lesson Introduction		
metal and automotive industries	Previous Knowledge		Tutor facilitates student teachers revision of previous knowledge on Philosophy of the metal and automotiveindustries, History of metal production and Modern developments and challenges facing the metal and automotive industries	Student teachers answer question and do brief discussions on Philosophy of the metal and automotiveindustries, History of metal production and Modern developments and challenges facing the metal and automotive industries		
	Personal safety Workshop Requirementsa nd safety, Workshop hygiene Workshop practices and ethics	Stage 2 - 60 min	Interactive Lecture Tutor usesInteractive lecture to make brief presentation on Personal safety and Workshop requirements and safety OR Discussion &Video Presentation Tutor usespre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss Personal safety and Workshop requirements and safety	Interactive Lecture Student teachers listen, contribute to discussions and write down important points. Discussion & Video Presentation Student teachers engage in discussions and do power point presentation on Personal safety and Workshop requirements and safety.		
		Stage 3 - 50 min	Discussion & Video Presentation Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to guide student teachers to discuss Workshop hygiene	Discussion & Video Presentation Student teachersdiscuss,and produce a report onWorkshop hygiene		
		Stage 4 - 50 min	Group Discussion Tutor guide students in groups to discuss Workshop practices and ethics	Group Discussion Student teachers engage in discussions and do PowerPoint presentation onWorkshop practices and ethics		
		Stage 5 - 10 min	Closure Reflection and Closure.	Closure Students reflect on Personal safety,		

				Workshoprequirements and safety, Workshop
				hygiene and Workshop practices and
				ethics.
Lesson assessments –	Component 1 Asse	ssment type: A	ssessment of Learnin	3
evaluation of learning:of,	Colores of Asses			
tor and as learning within the lesson (linking to	Category of Assess	sment: quiz		
learning outcomes)	1. Personal s	afety,		
	2. Workshop	requirements	and safety,	
	3. Workshop) hygiene hygiene and i	athics in the Motal and	Automotivo industrios
	4. Workshop	s assessed: LO1		automotive industries.
	Weighting (40%)			
	Component 2			
	Assessment Type:	Assessment for	and as Learning	
	Component 2; Con	itinuous Assess iment:	ment 1	
	Student teachers as	ssessed throug	n observation and con	tributions to class discussion, Oral
	Presentations such	as Power-Poir	it presentations, repo	rts as well as portfolio on the lesson:
	1. Group pre 2. Small Grou	esentation on Po up Report on M	ersonal safety CLO1 Jorkshon requirement	s and safety CLO1
	3. Small Grou	up Power-Point	presentations on Wor	kshop hygiene and Workshop
	practices a	and ethics in th	e Metal and Automot	ve industries
	4. Reflection	by student tea	chers	
	Learning Outcome	s assessed: LO1		
	Weighting (60%)			
Teaching Learning	1. Computer	s (Laptops or P	Cs)	
Resources	2. Interactive	e boards		
	3. Internet fa	acility		
Required Text (core)	Callister, W.D and F	Rethwisch, D.G Wiley	(2013). Materials Scie	nce and Engineering: An Introduction
	Denton, T. (2014).	Automobile ele	ctrical and electronic	ystems. Amsterdam: Butter-worth-
	Dolan, J.A. (1979).	n. Motor vehicle t	echnology and practic	al work (Parts 1 and 2). Hong Kong:
	Heineman	n Educational B	ooks Ltd.	, , , ,
	Sackey, J.K.N. &Am	ioakohene, S.K.	(1996). Metalwork Te	chnology. London, Macmillan
Additional Reading List	Gill, P. S. (2011). A	textbook of aut	omobile engineering	vol. 1).New Delhi: S. K. Katari&Sons.
	Hillier, V.A.W. (199	1). Fundament	als of motor vehicle te	chnology (4th ed.). Musselburgh:
	Stanley ThornesLtd	l.		
	toProperties, App	lications and De	1). Engineering Mater esign 4th Edition, Butt	als 1, Fourth Edition: An Introduction erworth-Heinemann
CPD Needs	1. Document	tary Analysis an	d discussion on Philos	ophy of the metal and automotive
	industries,	, History of met	al production and Mo	dern developments and challenges
	Tacing the 2 Manipulat	metal and auto	motive industries	
	3. Organising	g Class / group	Discussions (THEME 3	,5)
	4. Portfolio E	Building onMod	ern developments and	I challenges facing the metal and

Year of B.Ed.	2	Semester	1 Plac	Place of lesson in semester		123	3 4 5 6	7891011	12	
Title of Lesson		Philosophy and h concepts and saf	nistoryof engin fe workingenvi industries	eering, phi ronment ir	losophies, the metal	Lesson Du	uration	180 minute	180 minutes	
Lesson description	n	This lesson aim t	o help student	teachers t	o acquire the s	kills and kr	nowledge	in Material s	afety i.e	
Previous student knowledge, prior (assumed) Possible barriers t	teacher learning to	Student-teacher • Familiar	s are: r with Material	s used in th	ne Metal and A	utomotive	Industrie	25.		
learning in the lesson Lesson Delivery – chosen to support students in achieving the outcomes		Face-to-face☑	Face-to-face☑ Practical Activity		Seminars	Independ Study	ent e- or ☑	learning oportunities	Practic um	
Lesson Delivery mode of delivery support student in achieving the outcomes.	 main chosen to teachers learning 	Use Interactive I transporting, dis Use pre-video re discuss, prepare disposal, etc.	ecture to mak posal, etc. ecordings fron and present a	e brief pres n sources (\ Portfolio o	entation on M ′ouTube, Khan n Material safe	aterial safe Academy, ety i.e stora	ety i.e sto Coursera age, hand	rage, handlin , Udemy, MO ling, transpor	g, OCs) to ting,	
 Purpose for t what you w students to serves as bas learning outo expanded w the description Write in full a the NTS address 	he lesson, want the achieve, sis for the comes. An ersion of on. aspects of essed	 sson, The purpose of this lesson is to introduce student teachers to the relevant ski inMaterial safety i.e storage, handling, transporting, disposal, etc. in the s. An n of cts of d 					kills and knov	vledge		
 Learning Out the lesson, pi developed fro course specif Learning indi- each learning 	Learning Outcome for the lesson, picked and developed from the course specification Learning Outcomes Learning Indicators Learning indicators for each learning outcome			Ide cut trai incl add Hov add	Identify which cross- cutting issues - core and transferable skills, inclusivity, equity and addressing diversity. How will these be addressed or developed		-			
	CLO.1 Demonstrate1.4 Prepare a report onknowledge and understandingenvironment requirements foin the relevant foundationallearning/school setting.history, philosophies,conceptsand Safe Workingenvironment in themetal and automotiveindustriesindustries			ents for the	•	critical thinki diversity and inclusivity,	ng			
Торіс		Topic Sub topic	Stage/Tim	Teach outco e led,co	ing and lea mes: dependi Ilaborative gro	arning ac ng on deli oup work o	ctivitiesto very mo or indepe	o achieve de selected. ndent study	learning Teacher	r
Philosophy and hi	story	Sub-topic		Teach	er Activity		•	Student Ad	tivity	
of engineering, philosophies, concepts and safe working environment in the metal and automotive industries		Previous Stage 1 - 10 Knowledge min) Introc Tutor teach knowl in the	IntroductionInTutor facilitates studentInteachers revision of previousStknowledge on Materials usedquin the Metal and AutomotivediIndustrias			Introduction Student teachers answer question and do brief discussions.		

		Stage 2 - 60 min	Discussion & Video Presentation	Discussion & Video Presentation			
	Material safetystorage handling transporting disposal, etc.		Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss Material safety and storage	Student teachers listen, contribute to discussions and write down important points. Student teachers engage in discussions and do power point presentation onMaterial safety andstorage.			
		Stage 3 - 60 min	Discussion & Video Presentation	Discussion & Video Presentation			
			Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discussHandling and Transporting of Materials.	Student teachers prepare and present a Portfolio on Handling and Transporting of Materials.			
		Stage 4 - 40 min	Discussion Tutor guide students in groups to discuss ways of disposal metal waste	Discussion Student teachers engage indiscussions and present a report on ways of disposing metal waste.			
		Stage 5 - 10 min	Closure Tutor guide student teachers to Reflect on Material safety, Storage, handling, transporting and Disposal of metal waste to Close the Lesson.	Closure Students reflect on Material safety, Storage, handling, transporting and Disposal of metal waste.			
Lesson assessments – evaluation of learning:of,	Component 1 As	sessment type: A	Assessment of Learning				
for and as learning within the lesson (linking to learning outcomes)	Category of Assessment: quiz Material safety, Storage, handling, transporting and Disposal of metal waste						
	Learning Outcom Weighting (40%)	nes assessed: LO2	2				
Teaching Learning	Component 2 Assessment Type Component 2; Co Category of Asse Student teachers Presentations su 1. Group p metal w 2. Small Gr Disposal 3. Reflection Learning Outcom Weighting (60%)	e: Assessment fo ontinuous Assess ssment: assessed throug ch as Power-Poin resentation onM aste CLO1 roup report writin of metal waste (on by student tea nes assessed: LO2 ers (Laptops or P	r and as Learning sment 1 h observation and contributions nt presentations, as well as port laterial safety, Storage, handling, ng on Material safety, Storage, ha CLO1 achers 2 Cs)	to class discussion, Oral folio on the lesson: transporting and Disposal of andling, transporting and			
Resources	2. Interacti	ive boards	-				

	3. Internet facility
Required Text (core)	Callister, W.D and Rethwisch, D.G (2013). Materials Science and Engineering: An Introduction 9th Edition.Wiley.
	Denton, T. (2014). Automobile electrical and electronic systems. Amsterdam: Butter-worth- Heinemann.
	Dolan, J.A. (1979). Motor vehicle technology and practical work (Parts 1 and 2). Hong Kong: Heinemann Educational Books Ltd.
	Sackey, J.K.N. &Amoakohene, S.K. (1996). Metalwork Technology. London, Macmillan Publications
Additional Reading List	Gill, P. S. (2011). A textbook of automobile engineering (vol. 1).New Delhi: S. K. Katari&Sons.
	Thornes Ltd.
	Jones, D. R.H and Ashby, M.F (2011). Engineering Materials 1, Fourth Edition: An Introduction to
	Properties, Applications and Design 4th Edition, Butterworth-Heinemann
CPD Needs	Skills in Material safety, Storage, handling, transporting and Disposal of metal waste.

Y	ear of B.Ed.	2	Semester 1 Place of lesson in semester 1 2 3 4 5 6 7 8				3 4 5 6 7 8 9 10) 11 12				
							•					
Titl	e of Lesson		Materials u	used in the M	etal and Au	tomotive Indust	ries Less	on Duration	180 minutes			
Les	son descriptio	n	This lesson in the Met Non-ferrou of identifyi	This lesson aim to help student teachers to acquire the relevantknowledge onMaterials used in the Metal and Automotive Industries -Metals- a. Ferrous Metals (Cast iron and Steel), b. Non-ferrous metal, c. Alloys, d. Properties (mechanical, Physicaland Chemical), e. Methods of identifying metal								
Pre kno	vious student owledge, prior	teacher learning	Student-te Familiar wi	achers are: ith Material s	afety. Stora	ge, handling, tra	ansporting and [Disposal of metal v	waste			
(as	sumed)							•				
lea	rning in the les	son										
Les	son Delivery –	chosen	Face-to-	Practical	Work-	Seminars	Independent	e-learning	Practicu			
to s	support studer	its in	face⊠	Activity	Based		Study	opportunities	m			
ach	nieving the out	comes			Leaning			\mathbf{N}				
Les	son Delivery	– main	Use Intera	ctive lecture	to make bri	ef presentation	on the relevant	knowledge on Me	etals- a.			
mo	de of delivery	chosen to	Ferrous M	etals (Cast iro	n and Steel), b. Non-ferrou	is metal, c. Allo	γs, identificing and table	_			
sup	oport student	teacners	d. Proper	rties (mechan	ical, Physica	liand Chemical)	e. Methods of	identifying metals	`			
	tomes	learning	llse nre- v i	ideo recordin	gs from sou	rces (YouTube	Khan Academy	Coursera IIdemy	MOOCs)			
Uu	comes.		to discuss.	prepare and	present a P	ortfolio on Meta	als	coursera, ouerny	, 100003			
			a. Ferrous Metals (Cast iron and Steel), b. Non-ferrous metal, c. Alloys, d. Properties									
			(mechanical, Physicaland Chemical), e. Methods of identifying metals									
٠	Purpose for t	he lesson,	The purpo	ose of this less	son is to int	oduce student	teachers to the	knowledge in Met	als			
	what you w	want the	a. Ferrous	Metals (Cast								
	students to	achieve,	iron and St	teel)								
	serves as bas	is for the	b. Non-fer	rrous metal								
	learning outo	omes. An	c. Alloys									
	expanded v	ersion of	d. Proper	rties								
	the description	on. Separte of	(mechanic	ai, Priysicai ical)								
•	the NTS addr	aspects of	e Methor	ical) Is of								
	the NTS audi	esseu	identifying	metals								
•	Learning Out the lesson, pi	come for cked and						Identify whi cutting issue	ich cross- es - core			
	developed fro	ication						skills inclus				
•	Learning indi	cators for	Learning C	Outcomes	Le	arning Indicato	rs	equity and	ivicy,			
	each learning	outcome						addressing	diversity.			
	U							How will the	ese be			
								addressed o	r			
								developed.				
			CLO 2. Exh	ibit knowledg	ge and 2.	1 Make a portfo	lio on the traini	ng • Creativit	ty			
			skills in the	e processes ar	nd m	aterials used in	the metal and	 critical t 	hinking			
			proper use	e of training	al	tomotive indus	tries	 diversity 	/ and			
				n the metal a				inclusivi	ty,			
				e muustries. (Informa	ation ,			
			NTECF pg.	29).				interacy	,			

Торіс	Topic	Stago/Ti	Teaching and learning outcomes: depending or	activities to achieve learning delivery mode selected. Teacher			
	Sub-topic	me	led,collaborative group work or independent study				
Materials used in the Metal and Automotive			Teacher Activity	Student Activity			
Industries	Previous Knowledge	Stage 1 - 10 min	Lesson Introduction	Lesson Introduction			
			Tutor facilitates student teachers revision of	Student teachers answer question and do brief discussions.			
			previous knowledge on				
			Material safety, Storage, bandling				
			transporting and				
			Disposal of metal waste				
	Metals	Charles 2					
	(Cast	Stage 2 - 60 min	Tutor uses Interactive	Student teachers listen, contribute			
	iron and Steel)	00 1111	lecture to make brief	to discussions and write down			
	b. Non-ferrous		presentation on	important points.			
	metal		Ferrous Metals (Cast				
	d. Properties		OR				
	(mechanical,		Video Presentation &	Video Presentation & Discussion			
	Physical and		Discussion	Student teachers engage in			
	e. Methods of		video recordings from	presentation on the production			
	identifying metals		sources (YouTube, Khan	processes of ferrous metals (pig			
			Academy, Coursera,	iron, cast iron andsteel)			
			toDiscuss the				
			production processes of				
			ferrous metals (pig iron,				
			cast iron and				
		Stage 3 -	Discussion & Video	Discussion & Video Presentation			
		60 min	Presentation	Student teachers discuss and			
			Tutor will use pre-	present a Portfolio on Non-ferrous			
			sources (YouTube, Khan	metal and Alloys			
			Academy, Coursera,				
			Udemy, MOOCs) to				
			discussion-ferrous metal and Allovs				
		Stage 4 -	Group Discussion	Group Discussion			
		40 min	rutor guide students in groups to discuss	Student teachers engage in discuss and present a report on			
			Properties	Properties (mechanical, Physical			
			(mechanical, Physical	and Chemical) and Methods of			
			and Chemical) and Methods of identifying	identifying metals			
			metals				
		Stage 5 -	Closure	Closure			
		10 min	Tutor present reflection	Students reflect on Properties of			
			(Mechanical, Physical	Chemical.			
			andChemical) and close				
			lesson .				

Lesson assessments –	Component 1 Assessment type: Assessment of Learning
for and as learning within	Category of Assessment: quiz
the lesson (linking to	
learning outcomes)	a. Ferrous Metals (Castiron and Steel)
,	b. Non-ferrous metal
	c. Alloys
	d. Properties (mechanical, Physical and Chemical)
	e. Methods of identifying metal
	Learning Outcomes assessed: LO2
	Weighting (40%)
	Component 2
	Assessment Type: Assessment for and as Learning
	Component 2; Continuous Assessment 1
	Category of Assessment:
	Student teachers assessed through observation and contributions to class discussion, Oral
	Presentations such as Power-Point presentations, as well as portfolio on the lesson:
	a. Ferrous Metals (Castiron and Steel)
	d Properties (mechanical Physical and Chemical)
	e. Methods of identifying metal. CLO2
	f. Reflection by student teachers
	Learning Outcomes assessed: LO2
	Weighting (60%)
Teaching Learning	1 Computers (Lontons or DCs)
Percentral Learning	1. Computers (Laptops of PCS)
Resources	3 Internet facility
	5. Internet identy
Required Text (core)	Callister, W.D and Rethwisch, D.G (2013). Materials Science and Engineering: An Introduction
	9th Edition.Wiley.
	Denton, T. (2014). Automobile electrical and electronic systems. Amsterdam: Butter-worth-
	Heinemann.
	Dolan, J.A. (1979). Motor vehicle technology and practical work (Parts 1 and 2). Hong Kong:
	HeinemannEducational Books Ltd.
	Sackey, J.K.N. &Amoakonene, S.K. (1996). Metalwork Technology. London, Macmilian
Additional Reading List	Cill D. S. (2011) A taythook of automobile angineering (vol. 1) New Delhi: S. K. Katari&Sons
Additional Reading List	Hillier V A W (1991) Eurodementals of motor vehicle technology (4th ed.) Musselburgh:
	Stanley Thornes Itd
	Jones, D. R.H and Ashby, M.F (2011). Engineering Materials 1. Fourth Edition: An Introduction
	to Properties, Applications and Design 4th Edition, Butterworth-Heinemann
CPD Needs	1. Skills in of identifying metals
	2. Skills in the production processes of ferrous metals (pig iron, cast iron and steel)

Year of B.Ed.	2	Semest	ester 1 Place of lesson in semester		1 2 3 4 5 6 7 8 9 10 11 12			10 11 12			
-		1									
Title of Lesson		Material Industrie	Aterials used in the Metal and Automotive Lesson Duration 180 minutes ndustries							inutes	
Lesson description	า	The less	on aim at in	troducing th	e student teach	er to the p	rocesse	es used to	produc	e artifacts	
		in the m	etal and au	tomotive ind	lustries and also	perform p	practica	l work in t	he		
		worksho	p.Student t	eachers will	be required to u	indertake	various	projects a	and pro	duce	
		artifacts	. In the prod	cess of desig	ning andproduci	ng the art	ifacts, t	he teache	r must k	be	
		introduc	ed to releva	ant issues of	equity and inclu	usivity with	hin the	industry a	s well a	s the	
		concept	of greening	IVEI by wa	y of considering	recycling,	re-desi	gning or r	e-using	waste	
Previous student	teacher	Student-	teachers ar	eFamiliar Wi	tn: Steell						
(accumed)	learning	a.rerrou	s metals (C	astiron and s	steer)						
(assumed)			enous meta	11							
		d Prope	ortios (mach	anical Phys	ical and Chemic	hac (le					
		e Metho	nds of ident	ifving metals		al) allu					
Possible barriers t	·0	Difficulty	in acquirir	or samples of	f metals						
learning in the les	son	Difficulty	/ III acquirii	ig samples of	Thetais						
Lesson Delivery –	chosen	Face-	Practical	Work-	Seminars	Indepen	dent	e-learnin	g	Practicum	
to support studen	ts in	to-	Activity	Based		Study		opportu	nities		
achieving the out	comes	face⊠		Leaning				⊡			
Lesson Delivery	– main	Use Inte	ractive lect	ure to make	brief presentati	on on skill	s in Hea	at treatme	ent of m	etals,	
mode of delivery	chosen to	Forms of	f metal and	Application	of metals.						
support student	teachers	Use pre-video recordings from sources (YouTube, Khan Academy, Coursera,									
in achieving the	learning	Udemy, MOOCs) to discuss, design and prepare a project workonHeat treatment									
outcomes.		of metals, Forms of metal and Application of metals.									
Purpose for t	he lesson,	The purpose of this lesson is to introduce student teachers to the skills in Heat treatment of									
what you w	want the	metals, Forms of metal and Application of metals.									
students to	achieve,										
serves as bas	is for the										
learning outc	omes. An										
the description	ersion of										
Write in full	n.										
• Write in full a	aspects of										
	esseu										
Learning Out	come for							Ide	entify w	hich cross-	
the lesson, pi	cked and							cut	tting iss	ues - core	
developed fro	om the							an	d transf	erable	
course specifi	cation							ski	lls, inclu	usivity,	
Learning indi	cators for	Learning	; Outcomes		Learning Indica	ators		eq	uity and	1	
each learning	outcome							ad	dressing	g diversity.	
							Ho	w will t	hese be		
								ad	dressed	or	
				المعاصم منتحا	2 1 Mali	falia !!		de	veloped	1 .	
		CLO 2. E	xhibit know	ledge and	2.1Make a por	ttolio on tr	ne th	•	Creativ	vity	
		SKIIIS IN t	ne processe	es and	training mater	iais used li	nine	•	critical	thinking	
		proper u	se of trainii	ig tal and	ivietal and Auto	motive		•	skills ir	n Heat	
				ιαι απα ίος (ΝΤς	2 2 Droparo a r	rojectwo	rk		treatm	ient	
		$n\sigma 10$	ive muusti	103. (1113	involving the	ise of mat	oriale				
		NTECE n	σ 29)		in the Metal an		tive				
		b. 291		industries							

Topic Materials used in the	Topic Sub-topic	Stage/Time	Teaching and learning activitiesto achieve learning outcomes: depending on delivery mode selected. Teacher led,collaborative group work or independent study			
Metal and Automotive Industries			Teacher Activity	Student Activity		
	Previous Knowledge	Stage 1 - 10 min	Introduction Tutor facilitates student teachers revision of previous knowledge on with principles guiding Working Drawings and merits of Working Drawings	Introduction Student teachers answer question and do brief discussions.		
	Heat treatment of metals 2.Forms of metal 3.Application of metals.	Stage 2 - 60 min	Brainstorming Teacher facilitate student teacher transition to the new lesson onHeat Treatment of Metalswith the use of 'know- want to know and learnt' (KWL). OR Video Presentation & Discussion Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discussHeat Treatment of Metals.	Brainstorming Student teachers fillfirst two columns of Know- want to know and learnt (KWL) form and share to class with respect to what they already know about the topic and what they want to learn from the lesson. Video Presentation & Discussion Student teachers engage in discussions and do power point presentation on Heat treatment of metals.		
		Stage 3 - 40 min	Video Presentation Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to Forms of Metal	Video Presentation Student teachers prepare and present models of Forms of Metals		
		Stage 4 - 60 min	Group Discussion Tutor guide students in groups to discuss, design and realise artefacts in metals- Application of Metals.	Group Discussion Student teachers engage in discussions design and realise artefacts in metals		
		Stage 5 - 10 min	Closure Tutor presents Reflection on Heat treatment of metals, Forms of metal and Application of metals to close.	Closure Students reflect on the Heat treatment of metals, Forms of metal and Application of metals.		
Lesson assessments – evaluation of learning:of, for and as learning within the lesson (linking to learning outcomes)	Component 1 Ass Category of Asse 1. Heat trea 2. Forms of 3. Applicati Learning Outcom Weighting (40%) Component 2	essment type: A ssment: quiz atment of metals metal on of metals. es assessed: LO2	ssessment of Learning			

	Component 2; Continuous Assessment 1
	Category of Assessment:
	Student teachers assessed through observation and contributions to class discussion, Oral
	Presentations such as Power-Point presentations, as well as Project work on the lesson:
	1. Heat treatment of Metals
	2. Forms of metal
	3. Application of metals.CLO2
	4. Reflection by student teachers
	Learning Outcomes assessed: LO2
	Weighting (60%)
Teaching Learning	1. Computers (Laptops or PCs)
Resources	2. Interactive boards
	3. Internet facility
	4. Cardboard paper
	5. Wooden boards
	6. Metal (Sheet metal, pipes, tubes) etc.
Required Text (core)	Callister, W.D.and Rethwisch, D.G. (2013) Materials Science and Engineering: An Introduction
nequirea rext (core)	9th Edition. Wiley.
	Denton, T. (2014). Automobile electrical and electronic systems. Amsterdam: Butter-worth-
	Heinemann.
	Dolan, J.A. (1979). Motor vehicle technology and practical work (Parts 1 and 2). Hong Kong:
	Heinemann Educational Books Ltd.
	Sackey, J.K.N. &Amoakohene, S.K. (1996). Metalwork Technology. London, Macmillan
	Publications
Additional Reading List	Gill, P. S. (2011). A textbook of automobile engineering (vol. 1).New Delhi: S. K. Katari&Sons.
	Hillier, V.A.W. (1991). Fundamentals of motor vehicle technology (4th ed.). Musselburgh:
	Stanley Thornes Ltd.
	Jones, D. R.H and Ashby, M.F (2011). Engineering Materials 1, Fourth Edition: An Introduction
	to Properties, Applications and Design 4th Edition, Butterworth-Heinemann
CPD Needs	a) Skills in designing and making artefacts in metals

Y	ear of B.Ed.	2	Semester	1	Place of lesson in semester 12		2345	3 4 5 6 7 8 9 10 11 12					
			_										
Titl	e of Lesson		Materials us Automotive	Materials used in the Metal andLesson Duration180 minutesAutomotiveIndustries									
Les	son descriptio	n	The lesson a	aim at equip	oping the st	udent teache	r with requisite kr	nowled	lge and skill	s in			
			themetal ar	nd automoti	ve industrie	es. The studer	it teacher will be	introd	uced to Plast	tic materials			
			practical wo	ork in the w	orkshop	i the metal an	a automotive ind	ustries	s and also pe	enorm			
Pre	vious student	teacher	Student-tea	chers are fa	amiliar with	:							
kno	owledge, prior	learning	1. He	at treatmer	nt of Metals								
(as	sumed)		2. For	rms of meta	al								
			3. Ap	plication of	metals								
Possible barriers to													
Les	son Delivery –	chosen	Face-to-	Practical	Work-	Seminars	Independent	e-lea	arning	Practicum			
tos	support studen	nts in	face⊠	Activity	Based		Study	opp	ortunities				
ach	ieving the out	comes			Leaning			Ø					
Les	son Delivery	– main	Use Interac	tive lecture	to make br	ief presentati	on on basic mani	pulativ	e skills in Sc	ale			
mo	de of delivery	chosen to	Modelling of Designs										
in achieving the learning		to discuss, prepare and present a Portfolio on Scale Modelling of Designs											
out	comes.												
•	Purpose for t	he lesson,	The purpose	e of this less Thormoniae	son is to pro	ovide student	teachers with the	e releva	ant knowled	ge on			
	students to	achieve.	d. Problemsassociated plasticdisposal										
	serves as bas	sis for the											
	learning outo	comes. An											
	expanded vo	ersion of											
•	Write in full	on. Aspects of											
•	the NTS addr	essed											
•	Learning Out	come for							Identify wh	nich cross-			
•	the lesson, pi	cked and							cutting issu	les - core			
	developed fro	om the							and transfe	erable skills,			
	course specif	ication	Learning Ou	utcomes	L	earning Indica	ators		inclusivity,	equity and			
•	Learning indi	cators for				0			addressing	diversity.			
	each learning	outcome							addressed	or			
									developed	•			
			CLO 2. Exhib	oit knowled	ge and 2	.1 Make a por	tfolio on the		Creativ	ity			
			skills in the	processes an	nd t	raining mater	ials used in the		critical	thinking			
			proper use	or training	and in	ietai and auto idustries	omotive		 diversit 	y and			
			automotive	industries.	(NTS 2	.2 Prepare a p	oroject work		 skills in 	design and			
			pg. 10,		i	nvolving the ι	ise of materials		make a	rtefacts in			
			NTECF pg. 2	9)	ir	the metal ar	d automotive		Plastics	;			
					ir	dustries							

Торіс	Topic	Stage/Time	Teaching and learning activitiesto achieve learning outcomes: depending on delivery mode selected. Teacher led.collaborative group work or independent study			
Materials used in the	Sub-topic		Teacher Activity	Student Activity		
Industries	Previous Knowledge	Stage 1 - 10 min	Introduction Tutor facilitates student teachers revision of previous knowledge on Heat treatment of Metals, Forms of metal andApplication of metals.	Introduction Student teachers answer question and do brief discussions.		
	Plastics Thermoplastics	Stage 2 - 60 min	Video Presentation & Discussion Tutor will use pre-video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discussThermoplastics	Video Presentation & Discussion Student teachers engage in discussions and do power point presentation onThermoplastics and their properties.		
	Thermosetting Properties	Stage 3 - 60 min	plastics and their Properties Video Presentation & Discussion Tutor will use pre- video recordings from sources (YouTube, Khan Academy,	Video Presentation & Discussion Student teachers discuss, prepare and present portfolio onThermosetting		
		Stage 4 - 40	Coursera, Udemy, MOOCs) to discussThermosetting plastics and their properties.	plastics and their properties		
	Problems	min	Tutor guide students in groups to discuss Problems associated with disposal Plastics.	Student teachers engage in discussions and present report on Problems associated with Disposal of Plastics.		
	plastic disposal	Stage 5 - 10 min	Closure Tutor gives Reflection on Thermoplastics and their Properties, b.Thermosetting and their Properties, c.Problems associated with disposal of Plastics to close lesson.	Closure Students reflect onThermoplastics and their Properties, b.Thermosetting and their Properties, c.Problems associated with disposal of Plastics.		
Lesson assessments –	Component 1 Ass	essment type: A	ssessment of Learning			
evaluation of learning:of, for and as learning within the lesson (linking to	Category of Asse	ssment : quiz				
learning outcomes)	a.Thermoplastics b.Thermosetting c.Problems assoc	and their Proper and their Proper ated disposal of	ties ties Plastics			
	Learning Outcom Weighting (40%)	es assessed: LO2	1			
	Component 2 Assessment Type Component 2; Co	: Assessment for Intinuous Assess	and as Learning ment 1			
	Student teachers	assessed through	n observation and contributions	to class discussion, Oral		

	Presentations such as Dower Doint presentations, Depart writing, as well as Dertfolio on the
	losson
	lessoll.
	a. Inermoplastics and their Properties
	b. Thermosetting and their Properties
	c.Problems associated disposal of Plastics
	d. Reflection by student teachers
	Learning Outcomes assessed: LO2
	Weighting (60%)
Teaching Learning	1. Computers (Laptops or PCs)
Resources	2. Interactive boards
	3. Internet facility
	4. Plastic materials (Sheet, granules, etc,)
Required Text (core)	Callister, W.D and Rethwisch, D.G (2013). Materials Science and Engineering: An Introduction 9th Edition Wiley
	Denton T (2014) Automobile electrical and electronic systems. Amsterdam: Butter-worth-
	Heinemann.
	Dolan, J.A. (1979). Motor vehicle technology and practical work (Parts 1 and 2). Hong Kong:
	Sackey LKN & Amagkahang S.K. (1996) Matalwark Tachnology London Macmillan
	Publications
Additional Reading List	Gill, P. S. (2011). A textbook of automobile engineering (vol. 1). New Delhi: S. K. Katari&Sons.
C C	Hillier, V.A.W. (1991). Fundamentals of motor vehicle technology (4th ed.). Musselburgh:
	Stanley Thornes Ltd.
	Jones, D. R.H and Ashby, M.F (2011). Engineering Materials 1. Fourth Edition: An Introduction
	toProperties. Applications and Design 4th Edition. Butterworth-Heinemann
CPD Needs	a) Documentary Analysis and discussion on disposal of plastics
0. 2	

Ye	ar of B.Ed.	2	Semester 1 Place of lesson in semester				1 2 3 4 5 6 7 8 9 10 11 12				
Title	of Lesson		Materials Industries	used in the N	Aetal and A	Automotive		Lessor	Duration	180 n	ninutes
Less	on descriptio	n	This lessor Plastics.Th interest in and produ teacher m aswell as t using plast	Plastics.Thus, the lesson emphasizes problem-solving, critical thinking, creative skills and interest in hands-on activities.Student teachers will be required to undertake various projects and produce artefacts in plastics. In the process of designing and producing the artefacts, the teacher must be introduced to relevant issues of equity and inclusivity within the industry aswell as the concept of greening TVET by way of considering recycling, re-designing or re- using plastic waste.							
Prev knov (ass	vious student wledge, prior umed)	teacher learning	Student-te a.Thermor b.Thermos	eachers are fa plastics and t setting and the s associated	amiliar with heir Prope heir Prope disposal of	h: rties rties Plastics					
Poss	ible barriers	to									
Less to su achi	ning in the les on Delivery – upport studer eving the out	chosen ts in comes	Face-to- face☑	Face-to- Practical Work- Seminars Independent face Activity Based Study ☑ Leaning					e-learning opportuni ☑	ties	Practicum
Less mod supp in a outc	on Delivery le of delivery port student achieving the comes. Purpose for t what you students to serves as bas learning out expanded v the descriptio Write in full the NTS addr	 main chosen to teachers learning he lesson, want the achieve, sis for the comes. An ersion of on. aspects of 	Use Intera Manufactu 1. Extrusio 2. Injection 3. Compre 4. Blow. Use pre- v to discuss, Processes 1. Extrusio 2. Injection 3. Compre 4. Blow for The purpo skills in the 1. Extrusio 2. Injection 3. Compre 4. Blow	Use Interactive lecture to make brief presentation on the relevant knowledge and skills in the Manufacturing Processes of Plastics 1. Extrusion 2. Injection moulding 3. Compression 4. Blow. Use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss, prepare and present a Portfolio on the Manufacturing Processes of Plastics 1. Extrusion 2. Injection moulding 3. Compression 4. Blow forming The purpose of this lesson is to introduce student teachers to the relevant knowledge and skills in the ManufacturingProcesses of Plastics 1. Extrusion 2. Injection moulding 3. Compression 4. Blow forming The purpose of this lesson is to introduce student teachers to the relevant knowledge and skills in the ManufacturingProcesses of Plastics 1. Extrusion 2. Injection moulding 3. Compression 4. Blow							d skills in the my, MOOCs)
•	Learning Out the lesson, pi developed fro course specif Learning indi each learning	come for icked and om the ication cators for g outcome	Learning Outcomes Learning Indicators Identify which crossing issues - core and the skills, inclusivity, explicitly addressing diversities these be addressed.				oss-cutting transferable equity and ity. How will ed or				
			CLO 2. Exh and skills i and prope materials i automotiv pg. 10, NTECF pg.	ibit knowled n the proces r use of trair n the metal e industries. 29)	ge 2.1 ses tra ning me and inc (NTS 2.2 inv inc	Make a por ining materia etal and auto lustries. Prepare a p volving the us the metal an lustries	tfolio on t als used ir motive roject wo se of mate d automo	he n the rk erials tive	 Ci cr di in sk re Pl 	reativity itical th versity clusivit cills in t ealizatic astics	y hinking and y, he on process of

Торіс	Topic	Stage/Tim	Teaching and learning ac outcomes: depending on deli led,collaborative group work o	ctivitiesto achieve learning ivery mode selected. Teacher or independent study
Materials used in the	Sub-topic	e	Teacher Activity	Student Activity
Industries	Previous Knowledge	Stage 1 - 10 min	Introduction Tutor facilitates student teachers revision of previous knowledge on Thermoplastics and their Properties, Thermosetting and their Properties and Problems associated disposal of Plastics	Introduction Student teachers answer question and do brief discussions.
	Manufac-turing Processes of Plastics 1. Extrusion 2. Injection moulding 3. Compression/ Press forming 4. Blow	Stage 2 - 60 min	Interactive Lecture Tutor usesInteractive lecture to make brief presentation on Manufacturing Processes of Plastics- Extrusion OR Video Presentation, Demonstration & Discussion Tutor will Use Video(s) from Internet sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss and demonstrate theManufacturing Processes of Plastics- Extrusion.	Interactive Lecture Student teachers listen, contribute to discussions and write down important points. Video Presentation, Demonstration & Discussion Student teachers engage in discussions, demonstration and production of objects using the Extrusionprocesses of Plastics
		Stage 3 - 60 min Stage 4 -	Video Presentation, Demonstration & Discussion Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss and demonstrate process of Injection moulding of Plastics Group Discussion	Video Presentation, Demonstration & Discussion Student teachers prepare and realise artefacts using the process of Injection moulding of Plastics
		40 min	Tutor guide students in groups to discuss anduseCompressionand Blow forming in making artefacts in plastics.	Student teachers engage in discussions and do project work using Compressionand Blow forming in making artefacts in plastics.
		Stage 5 - 10 min	Closure Tutor Reflects on the Extrusion, Injection moulding,Compression/ Press formingand Blow forming, in making artefacts in plastics to close the lesson.	Closure Students reflect on the Extrusion, Injection moulding,Compression/ Press formingand Blow forming, in making artefacts in plastics

Lesson assessments –	Component 1 Assessment type: Assessment of Learning
evaluation of learning:of,	
for and as learning within	Category of Assessment: quiz
the lesson (linking to	
learning outcomes)	Manufacturing Processes of Plastics
	1. Extrusion
	2. Injection moulding
	3. Compression/ Press forming
	4. Blow
	Learning Outcomes assessed: LO2
	Weighting (40%)
	Component 2
	Assessment Type: Assessment for and as Learning
	Component 2; Continuous Assessment 1
	Category of Assessment:
	Student teachers assessed through observation and contributions to class discussion, Oral
	Presentations such as Power-Point presentations, as well as Project work on the lesson:
	Manufacturing Processes of Plastics
	1. Extrusion
	2. Injection moulding
	3. Compression/Press forming
	4. Blow
	5. Reflection by student teachers.
	Learning Outcomes assessed LO2
	Learning Outcomes assessed: LOZ
Teaching Learning	1. Computers (Laptops or PCs)
Resources	2. Interactive boards
	3. Internet facility
	4. Plastic Materials (sheet, granules, etc)
Required Text (core)	Callister, W.D and Rethwisch, D.G (2013). Materials Science and Engineering: An Introduction
Required Text (core)	Callister, W.D and Rethwisch, D.G (2013). Materials Science and Engineering: An Introduction 9th Edition.Wiley.
Required Text (core)	Callister, W.D and Rethwisch, D.G (2013). Materials Science and Engineering: An Introduction 9th Edition.Wiley. Denton, T. (2014). Automobile electrical and electronic systems. Amsterdam: Butter-worth-
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Required Text (core) Additional Reading List CPD Needs	 Callister, W.D and Rethwisch, D.G (2013). Materials Science and Engineering: An Introduction 9th Edition.Wiley. Denton, T. (2014). Automobile electrical and electronic systems. Amsterdam: Butter-worth- Heinemann. Dolan, J.A. (1979). Motor vehicle technology and practical work (Parts 1 and 2). Hong Kong: Heinemann Educational Books Ltd. Sackey, J.K.N. & Amoakohene, S.K. (1996). Metalwork Technology. London, Macmillan Publications Gill, P. S. (2011). A textbook of automobile engineering (vol. 1).New Delhi: S. K. Katari&Sons. Hillier, V.A.W. (1991). Fundamentals of motor vehicle technology (4th ed.). Musselburgh: Stanley Thornes Ltd. Jones, D. R.H and Ashby, M.F (2011). Engineering Materials 1, Fourth Edition: An Introduction to Properties, Applications and Design 4th Edition, Butterworth-Heinemann Skills in Manufacturing processes in Plastics

Year of B.Ed.	2	Semest	er 1	Place of	Semester1Place of lesson in semester1 2		1 2 3 4 5 6 7 8 9 10 11 12		
Title of Lesson			Tools, Mach Processes	ine; and Me	tal Work Joinir	ıg	Lesson Duration	180 minutes	
Lesson description	n	This lesso	on aim at equi nt in the meta	pping stude I and auto	nt learners with notive industri	the knowledges.	e and skill in the u	se of Tools/	
Previous student knowledge, prior (assumed)	teacher learning	Student-teachers are familiar with: Manufacturing Processes of Plastics 1. Extrusion 2. Injection moulding 3. Compression/Press forming 4. Blow							
Possible barriers t	:0 :00								
Lesson Delivery – to support studen achieving the out	chosen its in comes	Face- to- face☑	Practical Activity	Work- Based Leaning	Seminars	Independen Study	t e-learning opportunities ☑	Practicum	
Lesson Delivery mode of delivery support student in achieving the outcomes.	 main chosen to teachers learning 	Use Inter Machine; Use pre- discuss, p	Use Interactive lecture to make brief presentation on the relevant knowledge and skills in Tools, Machine; and Metal Work Joining Processes. Use pre-video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss, prepare and present a Portfolio on the Tools, Machine; and Metal Work Joining Processe						
 Purpose f lesson, what the stude achieve, se basis for the outcomes. expanded ve the description Write in full a the NTS addre 	or the you want nts to rves as learning An ersion of on. aspects of essed	The purp the use o	The purpose of this lesson is to introduce student teachers to the relevant knowledge and skills in the use ofTools, Machine; and Metal Work Joining Processes						
 Learning Oute the lesson, pi developed fro course specifi Learning indic each learning 	come for cked and om the ication cators for outcome	Learning	Learning Outcomes Learning Indicators incl add will		Identify w cutting iss transferab inclusivity addressing will these or develop	hich cross- ues - core and le skills, , equity and g diversity. How be addressed ped.			
		CLO.3 De knowledg processes tools, equ machines automoti (NTS pg. 2	monstrate ge and skills in s and proper u uipment and s in the metal ve industries. 10, NTECF pg.	3 the e use of th in and 29)	1 Use and oper quipment and r le metal and au dustries.	ate tools, nachines in tomotive	Creative critical skills i tools, machi metal autom indust	rity thinking n operating equipment and nes in the and notive tries.	

Topic	Stage/Time	Teaching and learning activitie depending on delivery led,collaborative group work of	sto achieve learning outcomes: mode selected. Teacher or independent study
Sub-topic		Teacher Activity	Student Activity
Previous Knowledge	Stage 1 - 10 min	Introduction Tutor facilitates student teachers revision of previous knowledge on Manufacturing Processes of Plastics 1. Extrusion 2. Injection moulding 3. Compression/Press forming 4. Blow	Introduction Student teachers answer question and do brief discussions.
Identification and uses of 1.measuring tools 2. marking out tools 3. Holding tools 4.Striking tools 5.Cutting tools 5.Cutting tools o Files o Chisels o Hacksaws 6.Finishing tools and processes	Stage 2 - 60 min	Interactive Lecture Tutor usesInteractive lecture to make brief presentation Identification of Tools/Equipment-Measuring, Marking and Holding OR Video Presentation & Discussion Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to Discuss and present manipulative skills on Measuring, Marking, Holding and StrikingTools/Equipment	Interactive Lecture Student teachers listen, contribute to discussions and write down important points. Video Presentation & Discussion Student teachers engage in discussions and do power point presentation on uses of types ofTools/Equipment. Measuring, Marking, Holding and Striking.
	Stage 3 - 60 min Stage 4 - 40 min	Video Presentation & Discussion Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss the characteristicsof Identified Cutting tools Files, Chisels and Hacksaws Present video from Internet sources to demonstrate filing methods (cross and drawfiling) Group Discussion Tutor guide students in	Video Presentation & Discussion Student teachers prepare and present a Portfolio on thecharacteristics of IdentifiedCutting tools Files, Chisels and Hacksaws Present a project work to demonstrate filing methods (cross and draw filing) Group Discussion Student teachers engage in
	Stage 5 - 10 min	groups to discuss uses of IdentifiedFinishing tools and Processes Closure Tutor gives reflection on the types, characteristics and	discussions and do PowerPoint presentation on uses of Finishing tools and Processes Closure Students reflect on the types.characteristics and uses
	Topic Sub-topic Previous Knowledge Identification and uses of 1.measuring tools 2. marking out tools 3. Holding tools 4.Striking tools 5.Cutting tools 5.Cutting tools 0 Files 0 Chisels 0 Hacksaws 6.Finishing tools and processes	Topic Sub-topicStage/TimePrevious KnowledgeStage 1 - 10 minIdentification and uses of 1.measuring tools 2. marking out tools 3. Holding tools 4.Striking tools 5.Cutting tools o Files o Chisels o Hacksaws 6.Finishing tools and processesStage 2 - 60 minIdentification and uses of 1.measuring tools 2. marking out tools 3. Holding tools 4.Striking tools 5.Cutting tools o Files o Chisels o Hacksaws 6.Finishing tools and processesStage 3 - 60 minStage 3 - 60 minStage 4 - 40 min	Topic Sub-topicStage/Timedepending on delivery led_collaborative group work of Teacher ActivityPrevious KnowledgeStage 1 - 10 minIntroduction Tutor facilitates student teachers revision of previous knowledge on Manufacturing Processes of Plastics 1. Extrusion 2. Injection moulding 3. Compression/Press forming 4. BlowIdentification and uses of 1.measuring tools 2. marking out tools 3. Holding tools 4. Striking tools o Files o Hacksaws 6.Finishing tools and processesInteractive Lecture Tutor usesInteractive lecture to make brief presentation Identification af tools 2. marking out tools0.R Video Presentation & Discussion Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to Discuss and present mainpulative skills on Measuring, Marking Holding and StrikingTools/EquipmentStage 3 - 60 minVideo Presentation & Discussion Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to Discuss and present mainpulative skills on Measuring, Marking Holding and StrikingTools/EquipmentStage 3 - 60 minVideo Presentation & Discussion Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss the characteristicsof Identified Cutting tools Files, Chisels and Hacksaws Present video from Internet sources to demonstrate filing methods (cross and drawfiling)Stage 5 - 10 minClosure Tutor grues reflection on the types, characteristics and Processes

			uses of IdentifiedTools/Equipment in the Metal and Automobile industries	ofIdentifiedTools/Equipment in the Metal and Automobile industries					
Lesson assessments –	Component 1 As	Component 1 Assessment type: Assessment of Learning							
evaluation of learning:of,									
for and as learning within	Category of Asse	ssment: quiz							
the lesson (linking to									
learning outcomes)	1. Types of Tools /Equipment in Metal and Automobile industries								
	2. Characte	2. Characteristics of Identified Tools /Equipment. Metal and Automobile industries.							
	3. Uses of I	3. Uses of Identified Tools /Equipment. Metal and Automobile industries.							
	Learning Outcom	es assessed: LO3							
	Weighting (40%)								
	Component 2								
	Assessment Type	Assessment Type: Assessment for and as Learning							
	Component 2; Co	ontinuous Assess	ment 1						
	Category of Asse	ategory of Assessment:							
	Student teachers	udent teachers assessed through observation and contributions to class discussion, Oral							
	Presentations su	resentations such as Power-Point presentations, as well as portfolio on the lesson:							
	1. Group p	1. Group presentation of Portfolio on types of Tools /Equipment. in Metal and Automobile							
		Industries.cLU3							
	2. Small Gr	 Small Group PowerPoint presentation on characteristics and Uses of Identified Tools (Equipment in Metal and Automobile industrias) CLO2 							
	3. Uses of I	aentinea 100is / E	equipment. In Metal and Automo	oblie industries).CLO3					
	4. Reflection	4. Reflection by student teachers							
	Learning Outcomes assessed: LO3								
	Weighting (60%)								
Teaching Learning	1. Com	1. Computers (Laptops or PCs)							
Resources	2. Inte	ractive boards							
	3. Inte	 Internet facility Tools /Equipment in Metal and Automobile industries CLO2 							
	4. 100	4. TOOIS / Equipment. In Metal and Automobile industries.CLO3							
Required Text (core)	Callister, W.D and	Rethwisch, D.G	(2013). Materials Science and Er	ngineering: An Introduction 9th					
	Edition.Wiley.								
	Denton, T. (2014)	Denton, T. (2014). Automobile electrical and electronic systems. Amsterdam: Butter-worth-							
	Heinema	nn.							
	Dolan, J.A. (1979)	. Motor vehicle t	echnology and practical work (Pa	arts 1 and 2). Hong Kong:					
		nn Educational B	OOKS LLU. (1996) Metalwork Technology	London Macmillan Publications					
Additional Reading List	Gill P S (2011)	A textbook of aut	omobile engineering (vol 1) Nev	w Delhi: S. K. Katari&Sons					
	Hillier. V.A.W. (19	991). Fundamenta	als of motor vehicle technology (4th ed.). Musselburgh: Stanley					
	Thornes Ltd.	,		,					
	Jones, D. R.H and	Ashby, M.F (201	1). Engineering Materials 1, Four	th Edition: An Introduction to					
	Properties, Appl	ications and Desi	gn 4th Edition, Butterworth-Heir	nemann					
CPD Needs	1. Docume	ntary Analysis an	d discussion on Types, Character	ristics and Uses of Identified					
	Tools /E	quipment. Tools /	'Equipment. in Metal and Autom	nobile industries.					
	1								

Year of B.Ed.	2	Semester 1 Place of lesson in semest		nester	ester 1 2 3 4 5 6 7 8 9 10 11 12						
Title of Lesson		Tools, Mae Processes	chine; and M	etal Work Jo	ining	Lesson D	uration	180 minutes			
Lesson description	1	This lesso of the ski tools/equi for artefac workshop interest in	This lesson is to equip the student teacher with requisite knowledge and understanding of the skills in the metal and automotive industries. The student teacher will be introduced to tools/equipment, materials and processes used for artefacts in the metal and automotive industries and also perform practical work in the workshop. Thus, the lesson emphasizes problem-solving, critical thinking, creative skills and interest in hands-on activities.								
Previous student knowledge, prior (assumed)	teacher learning	Student-te	 Student-teachers are: Familiar with the Types and Uses of tools/ machines in the metal and automotive industries. 								
learning in the les	o son										
Lesson Delivery – to support studen achieving the out	chosen ts in comes	Face- to-face ☑	Practical Activity ☑	Work- Based Leaning	Seminars	Indeper Study	ndent e c	-learning pportunities	Practicum		
Lesson Delivery mode of delivery support student in achieving the outcomes.	 main chosen to teachers learning 	Use Intera use of Too Use pre- v discuss, pr Processes	Use Interactive lecture to make brief presentation on the relevant knowledge and skills in the use of Tools, Machine; and Metal Work Joining Processes. Use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss, prepare and present a Portfolio on the Tools, Machine; and Metal Work Joining Processes.								
 Purpose for the what you was students to serves as bas learning outcomer expanded we the description Write in full a the NTS addrese students and the statemer expanded we wanted the second statemer expanded the second statemer expanded the second statemer expanded statemer	he lesson, want the achieve, is for the omes. An ersion of on. aspects of essed	The purpo in the use Processes	The purpose of this lesson is to introduce student teachers to the relevant knowledge and skills in the use of Tools, Machine; and Metal Work Joining Processes.								
 Learning Oute the lesson, pi developed fro course specifi Learning indic each learning 	come for cked and om the cation cators for outcome	Learning Outcomes		Le	Learning Indicators			Identify which cross- cutting issues - core and transferable skills, inclusivity, equity and addressing diversity. How will these be addressed or developed			
		CLO.3 Den knowledge processes tools, equ machines automotiv (NTS pg. 1	nonstrate e and skills in and proper u ipment and in the metal a ve industries. 0, NTECF pg.	3. the ec ise of th in and 29)	1 Use and op Juipment and e metal and a dustries.	erate tools machines automotive	, in e	Cre crit skil of t equ ma the aut	ativity ical thinking ls in the use ools, upment and chines in metal and omotive		

industries.

Торіс	Topic	Stage/Time	Teaching and learning act outcomes: depending on deli led. collaborative group work of	ivities to achieve learning ivery mode selected. Teacher or independent study
Tools, Machine; and	Sub-topic		Teacher Activity	Student Activity
Processes	Previous Knowledge	Stage 1 - 10 min	Introduction Tutor facilitates student teachers revision of previous knowledge on Types and Uses of tools/ machines in the metal and automotive industries.	Introduction Student teachers answer question and do brief discussions.
	Classification of metal work joining processes (permanent and temporary) • Riveting.	Stage 2 - 40 min	Interactive Lecture Tutor uses Interactive lecture to make brief presentation on the Classification of metal work joining processes (permanent and Temporary) OR	Interactive Lecture Student teachers listen, contribute to discussions and write down important points.
	Soldering and Brazing processes and equipment		Video Presentation & Discussion Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss Classification of metal work joining processes (permanent and Temporary)	Video Presentation, Discussion& Power Point Preparation Student teachers engage in discussions and do power point presentation on Classification of metal work joining processes (Permanent and Temporary.)
		Stage 3 - 60 min	Video Presentation, Discussion and Demonstration Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss the equipment and demonstrate the processes ofRiveting.	Video Presentation, Discussion and Demonstration Student teachers discuss the equipment, demonstrate and present a project work onRiveting
		Stage 4 - 60 min Stage 5 - 10	Group Discussion & Demonstration Tutor guides students in groups to discuss the equipment and demonstrate the processes of Soldering and Brazing Closure	Video Presentation, Discussion and Demonstration Student teachers engage in discussions on the equipment and demonstrate and present a project work onSoldering and Brazing Closure
		min	Tutor Reflects on the metal work joining processes (permanent and temporary)	Students reflect on the metal work joining processes (permanent and temporary)

Lesson assessments –	Component 1 Assessment type: Assessment of Learning
evaluation of learning: of,	
tor and as learning within the lesson (linking to	Category of Assessment: quiz
learning outcomes)	1. Classification of metal work joining processes(permanent and temporary)
U ,	2. Riveting, Soldering and Brazing processes
	Learning Outcomes assessed: LO3
	Weighting (40%)
	Component 2
	Assessment Type: Assessment for and as Learning
	Component 2; Continuous Assessment 1
	Category of Assessment:
	Student teachers assessed through observation and contributions to class discussion, Oral
	Presentations such as Power-Point presentations, as well as project work on the lesson:
	1. Small Group Power Point presentation on Classification of metal work joining processes
	(Permanent and Temporary)CLO3
	2. Small Group Project Work on Riveling 3. Small Group Project Work on Soldering and Brazing
	4 Reflection by student teachers
	Learning Outcomes assessed: LO3
	Weighting (60%)
Teaching Learning	1 Divet equipment/cet
Resources	2 Interactive boards
	3. Internet facility
	4. Soldering bits
Required Text (core)	Callister, W.D and Retnwisch, D.G (2013). Materials Science and Engineering: An Introduction 9th Edition, Wiley
	Denton, T. (2014). Automobile electrical and electronic systems. Amsterdam: Butter-worth-
	Heinemann.
	Dolan, J.A. (1979). Motor vehicle technology and practical work (Parts 1 and 2). Hong Kong:
	Heinemann Educational Books Ltd.
	Sackey, J.K.N. & Amoakohene, S.K. (1996). Metalwork Technology. London, Macmillan
Additional Reading List	Publications
	Publications Gill, P. S. (2011). A textbook of automobile engineering (vol. 1).New Delhi: S. K. Katari&Sons.
	Publications Gill, P. S. (2011). A textbook of automobile engineering (vol. 1).New Delhi: S. K. Katari&Sons. Hillier, V.A.W. (1991). Fundamentals of motor vehicle technology (4th ed.). Musselburgh: Stanley Thomas 1td
	Publications Gill, P. S. (2011). A textbook of automobile engineering (vol. 1).New Delhi: S. K. Katari&Sons. Hillier, V.A.W. (1991). Fundamentals of motor vehicle technology (4th ed.). Musselburgh: Stanley Thornes Ltd. Jones, D. R.H and Ashby, M.F (2011). Engineering Materials 1. Fourth Edition: An Introduction to
	PublicationsGill, P. S. (2011). A textbook of automobile engineering (vol. 1).New Delhi: S. K. Katari&Sons.Hillier, V.A.W. (1991). Fundamentals of motor vehicle technology (4th ed.). Musselburgh:Stanley Thornes Ltd.Jones, D. R.H and Ashby, M.F (2011). Engineering Materials 1, Fourth Edition: An Introduction toProperties, Applications and Design 4th Edition, Butterworth-Heinemann

Year of B.Ed.	2	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12

Title of Lesson		Operation of I	nternal Cor	nbustion Engi	nes	Lesson	Duration	180	minutes	
Lesson description	This lesso of the sk teacher w	This lesson aim at exposing the student teacher to the requisite knowledge and understanding of the skills in the metal and automotive industries. The lesson will equip the Student teacher with the skills, and principles in the Operation of Internal Combustion Engines.								
Previous student teacher knowledge, prior learning (assumed)	Student-t	 Familiar with Engines of Vehicles 								
Possible barriers to learning in the lesson										
Lesson Delivery – chosen to support students in achieving the outcomes	Face- to-face ☑	Practical Activity ☑	Work- Based Leaning	Seminars	Indepe Study	ndent	e-learning opportunit ☑	ties	Practicu m	
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Use Interactive lecture to make brief presentation on the Operation of Internal Combustion Engines Use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs)/ Simulation to discuss theOperation of Internal Combustion Engines						, MOOCs)/			
 Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. Write in full aspects of the NTS addressed 	The pur Combusti	oose of this less ion Engines	on is to intr	oduce studen	t teacher	s to the o	Operation o	f Inte	rnal	
 Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes		Lea	Learning Indicators			Identif cutting and tra inclusi addres How w addres develo	Identify which cross- cutting issues - core and transferable skills, inclusivity, equity and addressing diversity. How will these be addressed or developed		
	CLO 4. Ex understan operatior Combusti	khibit knowledge nding of the n of Internal ion Engines.	e and 4.1 rec Int dis 4.2 cor Col Eng	Use simulation ordings from ernet source t cuss to the op Discuss and p mparing mpression and gines.	ons and p o demon eration o produce a I Spark Ig	ore- video strate ar f engine: a report nition	o • nd • s.	crit thir skill ope Inte Cor Eng	ical hking Is in eration of ernal nbustion gines	

Торіс	Topic Sub-topic	Stage/Time	Teaching and learning activities to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study				
Operation of Internal			Teacher Activity	Student Activity			
Composition Engines	Previous Knowledge	Stage 1 - 10 min	Introduction Tutor facilitates student teachers revision of previous knowledge on Engines of Vehicles	Introduction Student teachers answer question and do brief discussions.			
	History of engines 2.Layout of an engine 3. Type of Internal Combustion	Stage 2 - 40 min	Interactive Lecture & Discussion Tutor uses Interactive Iecture to make brief presentation on the History of engines	Interactive Lecture & Discussion Student teachers listen, contribute to discussions and write down important points.			
	engines		OR Video Presentation& Discussion Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss History of engines	Video Presentation& Discussion Student teachers engage in discussions and do power point presentation onHistory of Engines.			
		Stage 3 - 60 min	Video Presentation & Discussion Tutor will use pre-video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss Layout of an engine.	Video Presentation, Discussion&Portfolio Presentation Student teachers prepare and present a Portfolio on the Layout of an engine.			
		Stage 4 - 60 min	Group Discussion Tutor guide students in groups to discuss Type of Internal Combustion engines	Group Discussion Student teachers engage in discussions and do PowerPoint presentation on characteristics, merits and demerits of the Types of Internal Combustion Engines			
		Stage 5 - 10 min	Closure Tutor Reflects on the characteristics, merits and demerits of the Types of Internal Combustion Engines and close lesson.	Closure Students reflect on the characteristics, merits and demerits of the Types of Internal Combustion Engines to end lesson.			

Lesson assessments – evaluation of learning: of	Component 1 Assessment type: Assessment of Learning
for and as learning within	Category of Assessment: quiz
the lesson (linking to	
learning outcomes)	1. History of engines
	2. Layout of an engine
	3. characteristics, merits and demerits of the Type of Operation of Internal
	Combustion Engines
	Learning Outcomes assessed: LO4
	Weighting (40%)
	Component 3
	Assessment Type: Assessment for and as Learning
	Component 2: Continuous Assessment 1
	Component 2, Continuous Assessment 1
	Student teachers assessed through observation and contributions to class discussion. Oral
	Brecentations such as Power Point presentations, as well as portfolio on the lesson:
	1 History of onginos
	1. History of engines
	2. Edyout of all eligine
	3. Characteristics, ments and dements of the type of Operation of Internal
	Combustion Engines CLO4
	4. Reflection by student teachers
	Learning Outcomes assessed: IOA
	Weighting (60%)
Teaching Learning	4. Interactive boards
Resources	5. Internet facility
	6. Type of Combustion Engines
Required Text (core)	Callister, W.D and Rethwisch, D.G (2013). Materials Science and Engineering: An Introduction 9th
	Edition. Wiley.
	Denton, T. (2014). Automobile electrical and electronic systems. Amsterdam: Butter-worth-
	Dolan I.A. (1070) Motor vohicle technology and practical work (Parts 1 and 2). Hong Kong:
	Heinemann Educational Books Ltd.
	Sackey, J.K.N. & Amoakohene, S.K. (1996). Metalwork Technology, London, Macmillan
	Publications
Additional Reading List	Gill, P. S. (2011). A textbook of automobile engineering (vol. 1). New Delhi: S. K. Katari&Sons.
	Hillier, V.A.W. (1991). Fundamentals of motor vehicle technology (4th ed.). Musselburgh: Stanley
	Thornes Ltd.
	Jones, D. R.H and Ashby, M.F (2011). Engineering Materials 1, Fourth Edition: An Introduction to
	Properties, Applications and Design 4th Edition, Butterworth-Heinemann
CPD Needs	Documentary Analysis and discussion on characteristics, merits and demerits of Internal
	mbustion Engines

Y	ear of B.Ed.	2	Semeste	ester 1 Place of lesson in semester			nester	1 2 3 4 5 6 7 8 9 10 11 12			
Titl	e of Lesson		Operation	of Internal Co	ombustion E	ngines	L	esson D	Ouration	180	minutes
Les	son description	n	This lesson aim at exposing the student teacher to the requisite knowledge and understanding of the skills in the metal and automotive industries. The lesson will equip the Student teacher with the characteristics of Internal Combustion Engines. This lesson will alsoexpose the student teacher to the differences betweenSpark Ignition Engines and Compression (Diesel)								
Pre	vious student	teacher	Student-te	eachers are:							
kno (as	owledge, prior sumed)	learning	1. F II	amiliar with c nternal Comb	haracteristic ustion Engin	cs, merits and es	d demerits	of the	Type of Op	eratio	on of
Pos lea	ssible barriers t rning in the les	:o son									
Les to s ach	son Delivery – support studen ileving the out	chosen its in comes	Face- to-face ☑	Practical Activity ☑	Work- Based Leaning	Seminars	Independ Study	dent	e-learning opportunit ☑	ies	Practicum
Les mo sup in out	son Delivery de of delivery pport student achieving the comes.	 main chosen to teachers learning Use Interactive lecture to make brief presentation on the differences betweenSpark Ignition Engines and Compression (Diesel) Engines. Use pre- video recordings/ simulation from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss, prepare and present a Portfolio on the characteristics the Spark Ignition Engines and Compression (Diesel) Engines 							rk Ignition Jursera, the Spark		
•	Purpose for t what you w students to serves as bas learning outo expanded w the descriptio Write in full a the NTS addre	he lesson, want the achieve, is for the omes. An ersion of on. aspects of essed	The purpose of this lesson is to introduce student teachers to the characteristics and differences betweenSpark Ignition Engines and Compression (Diesel) Engines								
•	Learning Oute the lesson, pi developed fro course specifi Learning india each learning	come for cked and om the ication cators for outcome	Learning (Outcomes	Le	Learning Indicators		Ide cut anc skil equ adc Hov adc		tify w ng iss transf , inclu ty and essing will t essed loped	hich cross- sues - core ferable usivity, d g diversity. these be d or d.
			CLO 4. Ex and unde operation Combustio	hibit knowled rstanding of of Internal on engines.	dge 4.2 the re co ig	2 Discuss and port compar mpression ar nition engine	d produce a ing nd spark es	a	1.crit 2.skil differ betw Igniti Com	ical t Is in rentia reen S on ar press	hinking ating Spark ad ion Engines

Tonic			Teaching and learning act	ivities to achieve learning			
Topic	Торіс	Stage/Time	led, collaborative group work or independent study				
Operation of Internal	Sub-topic		Toochor Activity	Student Activity			
Combustion Engines							
	Previous	Stage 1 - 10	Introduction	Introduction			
	Knowledge	min	lutor facilitates student	Student teachers answer			
			teachers revision of previous	discussions			
			characteristics merits and				
			demerits of the Type of				
			Operation of Internal				
			Combustion Engines				
		Stage 2 - 60	Video Presentation&	Video Presentation &			
		min	Discussion	Discussion			
	Spark Ignition		Tutor will use pre-video	Student teachers engage in			
	Compression		sources (YouTube Khan	noint presentation on			
	(Diesel)		Academy, Coursera, Udemy,	characteristics of Spark			
	Engines		MOOCs) to discuss	Ignition Engines			
	-		characteristics of Spark	0			
			Ignition Engines				
		Stage 3 - 60	Video Presentation&	Video Presentation			
		min	Discussion	Discussion& Portfolio			
			Tutor will use pre- video	Presentation			
			recordings from sources	Student teachers prepare			
			(YouTube, Khan Academy,	and present a Portfolio on			
			Coursera, Udemy, MOOCs)	the characteristics of			
			of Compression (Diosel)	Compression (Diesei)			
			Engines	Lingines.			
		Stage 4 - 40	Group Discussion	Group Discussion			
		min	Tutor guide students in	Student teachers engage in			
			groups to discuss the	discussions and do			
			differences betweenSpark	PowerPoint presentation on			
			Ignition Engines and	differences betweenSpark			
			Engines	Ignition Engines and Compression (Diesel)			
			Lingines	Engines			
		Stage 5 - 10	Closure	Closure			
		min	Tutor reflects on the				
			characteristics/differences	Students reflect on the			
			betweenSpark Ignition	characteristics/differences			
			Engines and Compression	betweenSpark Ignition			
			the lesson	(Diesel) Engines			
				(2.000) 2.18.100			
Lesson assessments –	Component 1 As	sessment type: A	Assessment of Learning				
evaluation of learning: of,	Catagory of Ass	comont: quiz					
the lesson (linking to	Category of Asse	ssment. quiz					
learning outcomes)	1. characte	eristics of Compre	ession (Diesel) Engines				
	2. characte	eristics of Spark Ig	gnition Engines				
	Loorning Outcom		n				
	Weighting (40%)	les assesseu. LO	•				
	Component 2	Accordent fo	r and as Learning				
	Component 2; Co	ontinuous Assess	sment 1				

	Category of Assessment:						
	Student teachers assessed through observation and contributions to class discussion, Oral						
	Presentations such as Power-Point presentations, as well as portfolio on the lesson:						
	1. Group presentation of Portfolio on the characteristics of Compression (Diesel)						
	Engines.CLO4						
	2. Small Group PowerPoint presentation on characteristics of Spark Ignition EnginesCLO4						
	3. Reflection by student teachers						
	Learning Outcomes assessed: LO4						
	Weighting (60%)						
Teaching Learning	1. Spark Ignition Engines and Compression (Diesel) Engines						
Resources	2. Interactive boards						
	3. Internet facility						
Required Text (core)	Callister, W.D and Rethwisch, D.G (2013). Materials Science and Engineering: An Introduction						
	9th Edition. Wiley.						
	Denton, T. (2014). Automobile electrical and electronic systems. Amsterdam: Butter-worth-						
	Heinemann.						
	Dolan, J.A. (1979). Motor vehicle technology and practical work (Parts 1 and 2). Hong Kong:						
	Heinemann Educational Books Ltd.						
	Sackey, J.K.N. & Amoakohene, S.K. (1996). Metalwork Technology. London, Macmillan						
	Publications						
Additional Reading List	Gill, P. S. (2011). A textbook of automobile engineering (vol. 1).New Delhi: S. K. Katari&Sons.						
	Hillier, V.A.W. (1991). Fundamentals of motor vehicle technology (4th ed.). Musselburgh:						
	Stanley Thornes Ltd.						
	Jones, D. R.H and Ashby, M.F (2011). Engineering Materials 1, Fourth Edition: An Introduction						
	to Properties, Applications and Design 4th Edition, Butterworth-Heinemann						
CPD Needs	1. Documentary Analysis and discussion on characteristics of Spark Ignition Engines and						
	Compression (Diesel) Engines						
	2. Manipulating of Interactive Board						
	3. Skills in operating Spark Ignition Engines and Compression (Diesel) Engines						

Y	ear of B.Ed.	2	Ser	nester 1 Place of lesson in			in sem	mester 1 2 3 4 5 6 7 8 9 10 11 12						
												_		
Tit	le of Lesson			Operation Engines	n of Inte	rnal Co	mbustion		Less	on Dura	ition	180 minutes		
Les	son descriptio	n		This lesso Internal C Engines.	This lesson aims to equip the Student teacher with the principles in the Operation of Internal Combustion Engines that is Spark Ignition Engines and Compression (Diesel) Engines.									
Pre	evious student	teacher		Student-t	eachers	are:								
kno	owledge, prior	learning		Familiar v	vith the	differe	ences betwe	en the	Spark	Ignitior	n Engine	s and Compres	sion (Dies	;el)
(as	sumed)		•	Engines.										
PO	ssible barriers i	to learnin	g in											
	son Delivery –	chosen to	`	Face-to-	Practic	al	Work-	Semir	nars	Inden	enden	e-learning	Practicu	m
sup the	port students outcomes	in achievi	ing	face 🗹	Activit	y Y	Based Leaning	Jenni	1013	t Stud	y	opportuniti es	Tucticu	
												Ŋ		
Les	son Delivery -	- main m	ode of	Use Inter	active le	cture	to make brie	f prese	ntatio	on on th	e Princip	ples of		
del	livery chosen	1 to si r in ach	upport	Operation	n of inter	rnalco	nbustion en	gines		a Khan	Acadom	. Coursoro III	longu	
the	learning outco	s III acii	lieving	MOOCs) t	o discus	s nrer	gs from sour	sent a l	Portfo	e, Khan dio on tl	he Princ	inles of	ieniy,	
the		omes.		Operation of internal combustion engines										
•	Purpose for t	he lesson	, what	The purpose of this lesson is to introduce student teachers to the Principles of										
	you want th	he stude	nts to	Operation of Internal Combustion Engines										
	achieve, serv	es as ba	sis tor											
	expanded v	outcome ersion o	f the											
	description.		i uic											
•	Write in full	aspects	of the											
NTS addressed														
•	Learning Out	come for	the								Identi	fy which cross-	cutting	
	lesson, picked	d and om tho co		Loarning							Issues	- core and trai	isterable	
	specification	om the co	urse	Outcome	s	Lear	ning Indicato	ors			addre	ssing diversity.	How will	
•	Learning indi	cators for	each	• accome							these	be addressed	or	
	learning outc	ome	cuen	developed.										
	-			CLO 4. Ex	hibit	4.1 l	Jse simulatio	ons and	l pre-		1.criti	cal thinking		
			knowledg	e and	vide	o recordings	from			2.skill	s in Principles o	f		
				understar	nding	Inter	net source t	0			Opera	ition of internal	~ ·	
				of the	- 6	dem	demonstrate and discuss			combustion engines, Spark		Spark		
				operation	OT	theo	peration of e	engines	•		Engine	on and compres	SION	
				Combusti	on						LIBIU	53		
				Engines	011									

Торіс	Topic	Stage/	Teaching and learning activities to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study				
Operation of Internal	Sub-topic	Time	Teacher Activity	Student Activity			
Spark Ignition Engines and Compression (Diesel) Engines.	Previous Knowledge	Stage 1 - 10 min	Introduction Tutor facilitates student teachers revision of previous knowledge on the differences between the Spark Ignition Engines and Compression (Diesel)	Introduction Student teachers answer question and do brief discussions.			
	Principles of operating Internal Combustion Engines	Stage 2 - 60 min	Interactive Lecture & Discussion Tutor uses Interactive lecture to make brief presentation on the Principles of Operating Spark Ignition Engines OR Video Presentation & Discussion Tutor will use pre- video recordings/ simulation from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss Principles of Operating Spark Ignition Engines.	Interactive Lecture & Discussion Student teachers listen, contribute to discussions and write down important points. Video Presentation, Discussion& Power Point Presentation Student teachers engage in discussions and do power point presentation on Principles of operating Spark Ignition Engines.			
		Stage 3 - 60 min Stage 4 - 40 min	Video Presentation & Discussion Tutor will use pre- video recordings from sources (YouTube, Khan Academy, Coursera, Udemy, MOOCs) to discuss Principles of Operating Compression (Diesel) Engines. Demonstration Tutor Use guided demonstration to illustrate the principles and operation of Spark Ignition and Compression (Diesel)	Video Presentation, Discussion& Power Point Presentation Student teachers prepare and present a Portfolio on the Principles of Operating Compression (Diesel) Engines Demonstration Student teachers engage indemonstration to illustrate the principles and operation of engines			
		Stage 5 - 10 min	Closure Tutor Reflects on the Principles of operating Spark Ignition Engines and Compression (Diesel) Enginesto close.	Closure Students reflect on the Principles of operating Spark Ignition Engines and Compression (Diesel) Engines.			

Lesson assessments – evaluation	Component 1 Assessment type: Assessment of Learning						
of learning: of, for and as							
learning within the lesson	Category of Assessment: quiz						
(linking to learning outcomes)							
	1. Principles of Operating Spark Ignition Engines						
	2. Principles of Operating Compression (Diesel) Engines						
	Learning Outcomes assessed: LO4						
	weighting (40%)						
	Component 2						
	Assessment Type: Assessment for and as Learning						
	Component 2: Continuous Assessment 1						
	Category of Assessment:						
	Student teachers assessed through observation and contributions to class discussion, Oral						
	Presentations such as Power-Point presentations, as well as portfolio on the lesson:						
	1. Small Group PowerPoint presentation on Principles of Operating Spark Ignition						
	EnginesCLO4						
	2. Group presentation of Portfolio on Principles of Operating Compression (Diesel)						
	Engines						
	3. Reflection by student teachers						
	Learning Outcomes assessed: LO4						
	Weighting (60%)						
Teaching Learning Resources	1. Spark Ignition Engines and Compression (Diesel) Engines						
	2. Interactive boards						
	3. Internet facility						
Required Text (core)	Callister W.D. and Rethwisch, D.G. (2013) Materials Science and Engineering: An						
Required Text (core)	Introduction 9th Edition Wiley						
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	worth-Heinemann.						
	Dolan, J.A. (1979). Motor vehicle technology and practical work (Parts 1 and 2). Hong						
	Kong: Heinemann Educational Books Ltd.						
	Sackey, J.K.N. & Amoakohene, S.K. (1996). Metalwork Technology. London, Macmillan						
	Publications						
Additional Reading List	Gill, P. S. (2011). A textbook of automobile engineering (Vol. 1).New Deini: S. K.						
	Hillier V A W (1991) Fundamentals of motor vehicle technology (4th ed.) Musselburgh						
	Stanley Thornes Ltd.						
	Jones, D. R.H and Ashby, M.F (2011). Engineering Materials 1, Fourth Edition: An						
	Introduction to Properties, Applications and Design 4th Edition, Butterworth-Heinemann						
CPD Needs	Principles in operating Spark Ignition Engines and Compression (Diesel) Engines						
Course Assessment	Component 1:Subject Portfolio Assessment (overall score = 30%)						
	Selected items of students work (3 of them=10% each)						
	Written Assignment						
	Group Procentation						
	• Midterm						
	assessment/Quiz=20%						
	Reflective Journal						
	=40%						
	Organisation of the Portfolio						
	= 10% (how it is						
	presented/ organized)						
	Weighting :30%						
	Assesses Learning Outcomes ; CLO 1,2,3,4,5 and 6						

Componen	t 2 : Subject Project(30% overall assessment)
Task stude	nt teachers to design a survey instrument to collect data on their
peers	perception of various ATR beliefs. Should be analysed and the
outcon	ne used to create a poster to be presented during the 11 th lesson.
•	Introduction; clear statement of aim and purpose=
	10%
•	Methodology : what the student has done and why=
	20%
•	Substantive or main sections=
	40%
•	Conclusion=
	30%
Assesses Le	arning Outcomes ; CLO 2,3,4 and 6
Component 3: End o	f Semester Examination= 40%
Assesses Le	arning Outcomes ; CLO 1,2,3,4,5 and 6

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