

Four-Year B.Ed. Course Manual

PARTICULATE NATURE OF CHEMISTRY









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.

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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

A.Course Information

Particulate nature of Chemistry

The vision for the New B.Ed. Curriculum

The vision is 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. This would improve the learning outcomes and life chances of all learners they teach as set out in the National Teachers' Standards. In doing this it would instil in new teachers the Nation's core values of honesty, integrity, creativity and responsible citizenship and to achieve inclusive, equitable, high quality education for all learners

i. Course Details

Course Name	Partic	ulate nature of Che	emistry		
Pre-requisite	Introd	uction to Integrate	d Science I an	d Introductio	on to Integrated Science II (from year 1)
Course Level	200	Course Code	Credit Val	ue 3	
1 Coulta					

1. Goal for the Subject or Learning Area

The science programme is designed to transform the JHS teacher into one imbued with the right knowledge, technology, pedagogy, innovation, content and the core values and attitudes to promote inclusivity and inspire active learning at the Junior HighSchool level.

2. Course Description

The course for semester one of year two uses the universal design for learning approach to extend the basic science concepts of the student teacher on the following content areas: Periodicity- Electron configuration, Chemical bond and compound formation, Chemical equations, Nature of Solutions, Colloids, Energy changes and separation of mixtures. This is done through appropriate pedagogies such as Nature walk, talk for learning approaches, demonstrations, concept mapping, problem-based teaching /learning, and video presentations as well as authentic assessment modes such as concept mapping, using checklist to identify values and attitudes and, mind maps that provide for the teachers' intention to ensure equity and provision for SEN. This course continues to emphasize on the essential attitudes and values (NTS, 1a-c)of professional science teaching such as honesty, carefulness and accuracy. The student teacher, in this course, should be introduced to issues of transition in terms of use of the English language as medium of instruction and characteristics and learning styles of early adolescent and Supported Teaching in School (STS) (NTS, 2e). Student teachers should as well manage the transition from Upper Primary to the JHS (NTS, 2e, p.13), (NTS, 1a-c, p. 12), (NTS, 2c, P. 13).

3. Key Contextual Factors

The Government, in its desire to improve the teaching and learning environment in the Junior High School has initiated several ongoing interventions. However, Junior High School education still face a number of challenges including the lack of commitment and involvement of parents, financial constraints and inadequate infrastructure. Some of the attendant challenges are:

- the lack of qualified teachers at the Junior High School level in the various subject areas.
- some school do not have sufficient number of teachers trained to identify, manage and support the learning challenges of adolescents.
- the school system lacks mechanisms to identify and support pupils with learning disabilities and other SEN
- many Junior High School teachers have low ICT competency and are unable to integrate ICT into their teaching and learning
- there are cultural practices and prejudices that prevent the creation of a learning environment conducive to supporting the learning of all learners. An example is the belief that STEM subjects are male specific and home economics is female specific.
- teaching at the Junior high school at the moment mostly focuses on passing the Basic Education Certificate Examination (BECE) and not on quality and depth in learning and personal development: this leads to teaching and learning by rote
- There is a lack of parental involvement in the teaching and learning process.

There is also a need for a conducive learning environment for a section of the early adolescent population who have the conception that STEM subjects are for boys rather girls.

The learning activities for this semester seeks to relate science to the learners' environment, make science culturally relevant and inclusive. It also seeks to promote professional scientific attitudes and skills development such as critical thinking, honesty, patience, sincerity, precision, and accuracy. Sensitive concepts may be explained within the appropriate local dialect and/or practices, in order to remove barriers that could prevent students of diverse abilities and strengths from participating in any science lesson, as well as managing transition from to middle childhood (Upper Primary) to early adolescent (Junior High School)

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

 Critical and Independent Thinking, Equity and Inclusivity, Social Collaboration/Team work, Creativity, Innovation, Problem solving, Manipulation, Reflection, developing scientific process skills and Inquiry.

 5. Course Learning Outcomes
 6. Learning Indicators

5. Course Learning Outcomes	
O1 Explain the need for Junior High School students to learn about	Produce reflective reports about links between
specific chemistry concepts in the JHS(NTS 2c, p.13 & 21)	Junior high school chemistry future careers and
	lifelong learning.

CLO2 Develop creative learning activities that can make the JHS school learner distinguish between metals and non-metals (NTS 2c, p.13 & 21)	 Create charts, concept mapsand mind maps about metals and non-metals
CLO3Recognize that some metals and objects made from iron when exposed to moisture in the presence of air will form rust and explain the effect of rusting on iron and demonstrate methods of preventing rust (NTS 2c, p.13 & 21), (NTS 2c, p.13 & 21)	 Present a mini project work on the conception of metals, non-metals and rusting in the immediate environment.
CLO4 Develop and use developmentally appropriate TLMs from locally available materials for teaching JHS school measurement (NTS 3j, pg. 14)	 Prepare improvised, developmentally appropriate materials for teaching at the primary school level
CLO5 Demonstrate an understanding of the principles of professional development observed during STS through reflective reporting. (NTS, 2c & 3e, Pg. 14 & 24)	 Prepare a reflective report on observations during STS for a seminar
CLO6 Demonstrate knowledge and application of the Teachers' Standards, for primary school curriculum, laws protecting children and all relevant regulations, and model positive values, attitudes and behaviours.Student teacher will be working towards meeting the NTS. (NTS 1b p14 & 18, 14)	 Provide a checklist to identify values such as patience, critical thinking, precision and accuracy in a peer review exercise Prepare a list of some examples of professional needs and some characteristics of professional teachers

7. Course Content			
Unit (Week)	Торіс	Subtopic (if any)	Teaching and learning activity to
			achieve the learning outcomes
Week 1	Review of Year 1 integrated science	Recap of year 1 lessons and challenges thereof.	 Demonstrations and discussions Reflections, presentations and designing Role playing/song creations
	Teaching Periodicity- Electron configuration	Arrangement of electron around the central nucleus of an atom, Properties of elements	 iv. Simulations, video and Computer presentation v. Produce charts and illustrations of forms and sources of energy
Week 2	Teaching Chemical bond and compound formation	Periodic trends, Covalent and ionic bonds formation	 i. Demonstrations and group discussions ii. Reflections, presentations and designing/game development iii. Concept mapping iv. Simulations, video and Computer presentation
Week 3	Teaching Chemical Equations	Chemical equations	 Face-to Face: Discussion, Role Playing, Construction of games, about plants and animals e-learning: Video and Computer simulation on teaching activities and assessment strategies.
Week 4	Teaching Chemical Reactions	Balancing Chemical equations	 Face-to-face: Mixed group discussions and demonstrations/role plays, Concept Mapping and Cartooning. e-learning/Reflections: Video presentations from MOOCs with reflections on values such as Honesty, Accuracy, Precision and critical thinking.
Week 5	TeachingNature of Solutions	 i. Types of solutions (Unsaturated, Saturated, Supersaturated) ii. Express concentration of a solution (percent by weight, mole fraction molarity 	Face-to-face:Discussion, Talk for learning approaches with student teacher presentations, Independent Face-to-face: Discussion, Talk for learning approaches with student teacher presentations, Independent Study: problem-based teaching, e-learning opportunities: multimedia

			and developing games.
Week 11	Teaching separation of	Separation of a named	report writing Face-to-Face: Modelling, Role playing
Week 10	TeachingEnergy changes	Energy Changes	and Game e-learning: OERs and MOOCs with report writing Face-to-Face: Think, Pair, Share, Share discussions, Reflections
Week 9	Teaching Colloids II	ii. Types of colloids Environmental and industrial importance	Computer simulations and OERs sources Independent Study: Inquiry and reflections Face-to-Face: Discussions, Role playing
Week 8	Teaching Colloids I	i. Concepts on colloid	learning approaches with student teacher presentations, Practical work. Face-to-face discussions, demonstration, mixed group work
Week 7	Seminar	reflecting on lessons 1-5 ii. STS Seminar	Presentations e-learning: OERs and MOOCs Independent Study: reflection on observations made during STS and problem-based learning: on National Teacher's Standards Eace-to-face: Discussion, Talk for
	Course Deview Lond CTC	parts per million, parts per billion)	e-learning opportunities: multimedia presentations

Component 1: Assessment of Learning (End of Semester Examination)

Summary of Assessment Method:Exams on key concepts as shown in the lessons/ Presentations of group work activities and inquiry assignments

Core skills to be acquired: Cognitive, literacy, numeracy, writing and reading

Weighting: 40%

CLO1, CLO4

NTS:

1b) Improves personal and professional development through lifelong learning and

Continuous Professional Development.

1d) Is guided by legal and ethical teacher codes of conduct in his or her

development as a professional teacher.

1g) Sees his or her role as a potential agent of change in the school, community

and country

2b) Has comprehensive knowledge of the official school curriculum, including

learning outcomes
2c) Has secure content knowledge, pedagogical knowledge and pedagogical
content knowledge for the school and grade they teach in.
3e) Employs a variety of instructional strategies that encourages student
participation and critical thinking.
3i) Explains concepts clearly using examples familiar to students.
3j) Produces and uses a variety of teaching and learning resources including ICT, to
enhance learning
Component 1: Subject Portfolio Assessment (30% overall score)
 Selected Item of Student work (3 items – 10%) = 30%
 Midterm assessment – 20%
 Beflective Journal – 40%
• Organization of the Subject Portfolio, 10% (How its presented/organized)
Component 2: Assessment for Learning (Presentations)
Summary of Assocsment Method: Dractical Activities/Peflective Notes/ evidence of values learned/Group work/Evidence of
summary of Assessment Method. Fractical Activities/Reflective Notes/ endence of Values learned/or oup work/Endence of
Core skills to be acquired. Longsty, corefulness, acquired, and televance
Core skills to be acquired: Honesty, carefulness, accuracy and tolerance
NIS:
1b) Improves personal and professional development through lifelong learning and
Continuous Professional Development.
1d) Is guided by legal and ethical teacher codes of conduct in his or her
development as a professional teacher.
1g) Sees his or her role as a potential agent of change in the school, community
and country
2c) Has secure content knowledge, pedagogical knowledge and pedagogical
content knowledge for the school and grade they teach in.
3e) Employs a variety of instructional strategies that encourages student
participation and critical thinking.
3j) Produces and uses a variety of teaching and learning resources including ICT, to
enhance learning
Component 3: End of Semester Examination – (40% overall Semester Assessment)
Component 3: Assessment as Learning (Review of Reports)
Summary of Assessment Method: Peer Review / Evidence of report from school visits for portfolio/Reflective notes
Core skills to be acquired: Pedagogical, observational and cooperative skills
Weighting: 30%-
CLO1 - CLO6
1b) Improves personal and professional development through lifelong learning and
Continuous Professional Development.
2c) Has secure content knowledge, pedagogical knowledge and pedagogical
content knowledge for the school and grade they teach in.
3e) Employs a variety of instructional strategies that encourages student
participation and critical thinking.
3i) Produces and uses a variety of teaching and learning resources including ICT, to
enhance learning
9. Required Reading and Reference List
Abbey, T. K., Alhassan, M. B., Amevibor, K., Essiah, J. W., Fometu, F., & Wiredu, M.B. (2008), Ghang association of science
teachers integrated science for senior high schools. Accra: Unimax MacMillan.
Abbey, T. K., & Essiah, J.W. (1995). Ghang association of science teachers physics for senior high schools. Accra: Unimax
Macmillan.
Amerihor K & Wiredu M B (2006) Ghana association of science teachers' chemistry for senior high schools Access Unimer
MacMillan
Asabere-Ameyaw A & Oppong F K (2013) Integrated science for the basic school teacher L Winnebas IFDF
Oddove E O K Taale K D Ngman-Wara E Samlafo V & Oheng-Ofori D (2011) SWI integrated science for senior high
schools: Students hook Accra Ghana: Sam-Moode Itd
10 Teaching and Learning resources
Smarthbanes Tablets Productivity tools (software that allow toochars to work batter). Subject based instructional
tools/applications Instructional laboratories Smart boards projectors Smart screeps Open EPs - VouTube Coursers Khan
ניסוא מעשונים אושני אושני מנטרומי ומטטימנטרובא, אומר טטמיטא, איט פרנטרא, אומר ארפרוא, טעפר ברא – דטערעטב, כטערצרא, אומר

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Academy, TESSA and UNESCO OERs, iBox, and standard laboratories

11. Course related professional development for tutors/ lecturers

- Development of Concept Maps/ Concept cartoons Charts/ technical/action research report writing/
- Training in Use of CMs/ Appreciating the place of the Cross-cutting issues in the CLOs and Teaching -Learning Activities/ Assessment component requirement for active learning/ model teaching to reflect the desired PCK students-teachers are required to learn.

Year of B.Ed.	2	Semeste	r 1	Place of less	son in semester	123456789	10 11 12		
Title of Lesson	Teachir	ng Periodici	ty- Electron c	onfiguration	Lesson Duration	3	Hours		
Lesson description	In this I position Periodi teacher position configu table o making studen nature elemen This firs compo	In this lesson, a review of year one introduction to science is initiated to place the student teacher in a position to benefit from this lesson and the subsequent lessons for this semester. A discussion of Periodicity (Electron configuration/arrangement and properties of elements) is done with Student-teachers. Mainly, periodicity refers to the occurrence of similar properties in elements occupying similar positions in the periodic table with increasing atomic number. Studentteachers will look at electron configuration, which involves the arrangement of electrons within an atom (the structure of the Periodic table of elements is partly based on electron configuration) and properties of elements with the view to making it simple and meaningful to the Junior High school learner. This lesson will enable studentteachers to appreciate the possible existence of several solids, liquids and gaseous substances in nature and also help them to teach Periodicity (Electron configuration/arrangement and properties of elements) to the basic school learner. This first lesson introduces student teachers to the course learning outcomes and the three assessment components of the course							
Previous student	Studen	tteachers a	re conversant	t with the orde	erly arrangement of th	ings like clothes, provisi	ons and		
teacher knowledge, prior learning (assumed)	books.								
Possible barriers to	Studer	ntteachers r	nay:						
learning in the	•	Have me	anings of Peri	iodicity (Electr	on configuration/arrai	ngement and properties	of elements)		
lesson		that may	be different	from the desc	riptions scientists use				
	•	Not have	the skills in t	eaching Period	dicity (Electron configu	aration/arrangement and	d properties		
	-	of eleme	nts) to the jui	nior highschoc	ol learner.		_		
Lesson Delivery –	Face-	Practic	WOrk- Based	Seminars	Study	e-learning	Practicum		
students in	face	Activity	Learning		v study	√			
achieving the	V	v v							
outcomes									
Lesson Delivery –	Face-to	Face: Disc	ussion, group	work,					
main mode of	Practic	al Activity: I	Manipulations	s of models an	d designing models to	reflect electron configu	ration.		
delivery chosen to	Indepe	ndent Stud	y: Inquiry and	reflections	Independent Study: Inquiry and reflections				
support student	e-learning opportunities: Use of internet MOOC, simulations and video presentations								
teachers in						deo presentations			
achieving the				Internet MOC	DC, simulations and vio	deo presentations			
achieving the				internet MOC	DC, simulations and vio	deo presentations			
achieving the learning outcomes.	• Pro	oper scienti	fic description	n of Electron c	DC, simulations and vic	deo presentations	lements		
achieving the learning outcomes. • Purpose for the lesson, what	Pro De	oper scienti monstrate	fic description the skill and k	n of Electron c	DC, simulations and vio onfiguration/arrangen	deo presentations nent and properties of e er	lements		
achieving the learning outcomes. • Purpose for the lesson, what you want the	• Pro • De	oper scienti monstrate	fic description the skill and k	n of Electron c nowledge to t	DC, simulations and vio onfiguration/arrangen each the subject matt	deo presentations nent and properties of e er	lements		
achieving the learning outcomes. • Purpose for the lesson, what you want the students to	• Pro • De	oper scienti monstrate	fic description the skill and k	n of Electron c	DC, simulations and vio onfiguration/arrangen each the subject matt	deo presentations nent and properties of e er	lements		
achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves	• Pro • De	oper scienti monstrate	fic description the skill and k	n of Electron c nowledge to t	OC, simulations and vie onfiguration/arrangen reach the subject matt	deo presentations nent and properties of e er	lements		
achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the	Pro De NTS, Th	oper scienti monstrate ne Teacher:	fic description the skill and k	n of Electron c	OC, simulations and vio onfiguration/arrangen each the subject matt	deo presentations nent and properties of e er	lements		
 achieving the learning outcomes. Purpose for the lesson, what you want the students to achieve, serves as basis for the learning 	Pro De NTS, Th 1c) Der 2a) Sm	oper scienti monstrate ne Teacher: nonstrates	fic description the skill and k effective grov	n of Electron c mowledge to t	DC, simulations and vio onfiguration/arrangen each the subject matt	deo presentations nent and properties of e er room and widerschool.	lements		
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achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the	 Pro De NTS, Th 1c) Der 3e) Em thinkin 3i) Prod 	oper scienti monstrate ne Teacher: nonstrates ploys a vari g.	fic description the skill and k effective grov ety of instruct	n of Electron c nowledge to t wing leadershi tional strategie	DC, simulations and vio onfiguration/arrangen reach the subject matt p qualities in the class es that encourages stu	deo presentations nent and properties of e er room and widerschool. Identparticipation and ci poluding ICT_toephance	lements ritical		
 achieving the learning outcomes. Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. 	 Pro De NTS, Th 1c) Der 3e) Em thinkin, 3j) Proo 	oper scienti monstrate ne Teacher: nonstrates ploys a vari g. duces and u	fic description the skill and k effective grov ety of instruct uses a variety	n of Electron c mowledge to t ving leadershi tional strategic of teaching an	DC, simulations and vio onfiguration/arrangen reach the subject matt p qualities in the class es that encourages stu d learning resources in	deo presentations nent and properties of e er room and widerschool. Identparticipation and ci ncluding ICT, toenhance	lements ritical learning.		
 achieving the learning outcomes. 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 	 Pro De NTS, Th 1c) Der 3e) Em thinkin 3j) Proo 	oper scienti monstrate ne Teacher: nonstrates ploys a vari g. duces and u	fic description the skill and k effective grov ety of instruct ses a variety	n of Electron c nowledge to t ving leadershi tional strategio of teaching an	DC, simulations and vie onfiguration/arrangen reach the subject matt p qualities in the class es that encourages stu d learning resources in	deo presentations nent and properties of e er room and widerschool. Identparticipation and ci ncluding ICT, toenhance	lements ritical learning.		
 achieving the learning outcomes. 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 	 Pro De NTS, Th 1c) Der 3e) Em thinkin 3j) Proof 	oper scienti monstrate nonstrates ploys a vari g. duces and u	fic description the skill and k effective grov ety of instruct uses a variety	n of Electron c mowledge to t ving leadershi tional strategio of teaching an	DC, simulations and vio onfiguration/arrangen reach the subject matt p qualities in the class es that encourages stu d learning resources in	deo presentations nent and properties of e er room and widerschool. Identparticipation and ci ncluding ICT, toenhance	lements ritical learning.		

 Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	 1. Demonstrate the understanding of elements, and electron configuration, and use it to explain the periodic trends and bond formation. 	 Provide samples of exercises explaining and predicting periodic trends (atomic size, ionic size, ionisation energy and electronegativity) across periods 2 and 3, and down groups 1 and 2 by student teachers Draw a chart to show the detailed configuration of the first 20 elements by student teachers. Provide samples of exercises on how student teachers describe two common types of bonds –covalent and ionic bonds- are formed and 		Identify which cross – cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed Correct/ handling and uses of devices, good identification of tools for measurements, sharing ideas in class, conversion of temperature from degree Celsius to degree Fahrenheit, Student-teachers develop skills of communication, collaboration and mutual respect while appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion.
		explain their	characteristics	
Topic/Title	Sub Topic	Time or Stage	Teaching and learning to depending on delivery m collaborative group work	achieve learning outcomes: ode selected. Teacher led, or independent study
			Teacher Activity	Student Activity
Review of Year 1 Integrated Science and Teaching Periodicity- Electron configuration	Recap of Year 1 lessons and challenges thereof	60 minutes	Face-to-face: Tutor initiat a Pyramid discussion on ti year 1 concepts with student teachers, and encourages them to reflec on the new concepts, the challenges and unique lessons. The lessons on chemical symbols and elements should be highlighted to link the starting concepts of periodicity	es Face-to-face: Student teachers work individually and in groups to discuss year one lessons, the challenges, unique values and produce a concept map of possible expectations in the content of the upper primary science lessons
	Arranging electrons around the central nucleus of an atom		 Face-to-face: Tutor introduces the lesson by reviewing student teache relevant previous knowledge on Periodicity. Face-to-face: Open-ende questions to elicit misconceptions/incorrect ideas about Periodicity (Electron configuration/ arrangement and propert of elements) Face-to-face: Tutor allows studentteachers to form mixed groups (gender- based) of 3 members to discuss about the arrangement of electron around the central nucleu of an atom. 	Face-to-face:Studentteachers tell their previous knowledge on Periodicity.Face-to-face:Studentteachers answer open-ended questions to bring their incorrect ideas on Periodicity (Electron configuration/arrangement and properties of elements)iesFace-to-face:SubscriptStudentteachers in mixed groups (gender- based) of 3 members discuss about the arrangement of electron around the central nucleus of an atom.

	Properties of	60 minutes	Face-to-face/e-learning:	Face-to-face: In mixed groups		
	elements		Tutor allows studentteacher	(gender-based) of 3 members,		
			to from mixed groups	studentteachers discuss about		
			(gender-based) of 3	the properties of elements and		
			members to discuss about	how to make materials to		
			the properties of elements	teach JHS they will produce		
			and use the properties to	written reports/charts on		
			develop learning materials.	them.		
			Require of the student			
			teachers to produce written			
			reports/charts on them.			
			The discussion should be			
			based on video resources			
			from MOOCs such			
			as <u>https://www.youtube.co</u>			
			m/watch?v=5SmndBRDU6s			
			https://www.youtube.com/			
	Tooching how to	60 minutes	(Accessed 22/06/2019)	Face to face /F learning		
	teaching now to	60 minutes		Pace-10-Tace/E-Tearning		
	(Electron		studentteachers to do short	in groups of 3 members (Mixed		
	configuration/		power point/poster	intellectual ability Groups) do		
	arrangement and		presentation on how to	power point/poster		
	properties of		teach Periodicity (Electron	presentation on how to teach		
	elements) to the		configuration/arrangement	Periodicity (Electron		
	Basic school learner		and properties of elements)	configuration /arrangement		
			to the Basic school learner	and properties of elements) to		
			(Mixed intellectual ability	the Basic school learner.		
			Groups of 3 members).			
Which cross cutting	Equity and SEN: throug	h setting ground ru	les to protect vulnerable stude	ntteachers and establishing an		
issues will be	interactive and inclusiv	e classroom atmos	phere. By practicing with the d	rawings of the electronic		
addressed or	configuration studentte	addressed.				
developed and now	auuresseu. Assessment as learning: Written renorts/charts produced by studentteachers on properties of elements					
– evaluation of	NTS 2c) Has secure content knowledge, nedagogical knowledge and nedagogical content knowledge for					
learning: of, for and	the school and grade they teach in.					
as learning within	NTS 3i) Produces and uses a variety of teaching and learning resources including ICT toenhance learning					
the lesson	Assessment of learning: Student teachers doing short presentations (3-5 minutes each) on how to teach					
	Periodicity (Electron configuration, and properties of elements) to the Basic school (Reflection on					
	presentations).					
	NTS1c) Demonstrates effective growing leadership qualities in the classroom and widerschool.					
	NTS 3e) Employs a variety of instructional strategies that encourages studentparticipation and critical					
	thinking.					
Teaching Learning	NTS 3J) Produces and u	ses a variety of tea	icning and learning resources in	Cluding ICI, toennance learning.		
Resources	https://www.khapacad	lemy org/science/c	hemistry/periodic_table/copy-c	-55/11/10BRDU05, of-periodic-table-of-		
Resources	elements/v/periodic-ta	ble-introduction (A	Accessed 22/06/2019)			
Required Text	Abbey, T. K., Alhassan,	B., Amevibor, K., E	ssiah. J. W Fometu. E & Wire	du. M.B. (2008). <i>Ghana</i>		
(core)	association of science t	eachers integrated	science for senior high schools.	Accra: Unimax MacMillan;		
	Handbook for PD Coord	dinators Themes 1-	- 10			
Additional Reading	Abbey, T. K., &Essiah, J	.W. (1995). Ghana	association of science teachers	physics for senior high schools.		
List	Accra: Unimax Macmill	an.				
	Ameyibor, K., & Wiredu	и, М. В. (2006). <i>Gh</i>	ana association of science teach	ers' chemistry for senior high		
	schools. Accra: Unimax	MacMillan.	40)			
	Asabere-Ameyaw, A., &	& Oppong, E. K. (20	13). Integrated science for the <i>k</i>	basic school teacher I. Winneba:		
			n E Comlata V 9 Ohan- Of-	ri D (2011) CIAU interneted		
	science for senior high	, N. D., Ngman-War schools: Students h	a, E., Samilaiu, V., & Ubeng-Uto	Ltd		
CPD Requirement	j. Working on r	naterials to teach I	HS Periodicity	5 LUU.		
	ii. Practicing ho	w to draw electron	hic configuration/arrangement a	around central atom accurately		

	iii. Tolerating others in group work					
Course Assessment	¹ Component 1: Subject Portfolio Assessment (30% overall score)					
	 Selected Item of Student work (3 items – 10%) = 30% 					
	 Midterm assessment – 20% 					
	Reflective Journal – 40%					
	 Organization of the Subject Portfolio- 10% (How its presented/organized) 					
	² Component 2: Subject Project (30% overall Semester score)					
	 Introduction; a clear statement of aim and purpose of the project -10% 					
	 Methodology; What the student teacher has done and why to achieve the purpose of the project – 20% 					
	 Substantive/Main section of the work – 40% 					
	Conclusion – 30%					
	Component 3: End of Semester Examination – (40% overall Semester Assessment					

¹ See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP ² See rubrics on Subject Project Assessment in Annex 6 of NTEAP

Ye	ar of B.Ed.	2	Semes	ter 1	Place of	lesson in s	emester	1 2 3 4 5 6 7 8	9 10 11 12	
Titl	e of Lesson		Teaching Chemical bond and compound formation Lesson Duration							
Les	son descriptio	n	In this less with a last chemical o used to te	son, Tutor dis ting attractior compounds. ٦ each chemical	cusses Peric n between a This lesson w bonds and o	dicity as a rec toms, ions or vill enable stu compound for	cap and discuss of molecules that a dent-teachers to rmation to the J	Chemical bonds, v enables the forma o model strategies H school learner.	vhich deals ation of s that can be	
Pre	vious student	teacher	Studentte	achers are co	nversant wi	th the electro	nic configuratio	n and draw the el	ectronic	
kno	wledge, prior		arrangem	ents of the fir	st-20 eleme	nts from less	on 1			
lea	rning (assume	d)	0.							
Pos	sible barriers	to	Studentte	eachers may:						
lea	rning in the les	son	•	Have meaning	gs of Periodi	city (Periodic	trends, Chemica	al bond and Comp	ound	
			1	formation) th	at may be d	fferent from	the descriptions	s scientists use		
			•	Not have the	skills in teac	hing Periodic	trends, Chemica	al bond and Comp	ound	
			1	formation to	the Basic Scl	nool learner.				
Les	son Delivery –	chosen	Face-to-	Practical	Work-	Seminars	Independent	e-learning	Practicum	
to s	support studer	nts in	face √	Activity	Based		Study√	opportunities		
ach	ieving the out	comes			Learning			V		
Les	son Delivery –	main	Face-to Fa	ace: Discussio	n, Demonsti	ations, role p	lay			
mo	de of delivery	chosen	Independe	ent Study: Inc	quiry and ref	lections				
to s	support studer	nt	e-learning	; opportunitie	es: Use of int	ernet, simula	tions and video	presentations		
tea	chers in achiev	ing the								
lea	rning outcome	S.								
•	Durnasa far t	ha	Drong	ar scientific de	accription of	Doriodic trop	de Chamical ha	nd and compound	d formation	
•	lesson what	Nou	 Prope Domo 	an scientific de	kill and know	vlodgo to top	ch tho subject m	niu anu compound		
	want the stur	you dents to	• Denic	Jistiale the s		wieuge to tea	ch the subject h	latter		
	achieve serv									
	basis for the	learning	NTS [.] The T	Teacher [.]						
	outcomes. Ar	1	1c) Demo	nstrates effec	tive growing	g leadership g	ualities in the cl	lassroom and wide	erschool.	
	expanded ver	rsion of	3e) Emplo	ovs a variety c	of instruction	al strategies	that encourages	studentparticipat	tion and	
	the description	on.	critical thi	nking.		0				
•	Write in full a	spects	3j) Produc	ces and uses a	a variety of t	eaching and l	earning resource	es including ICT, to	oenhance	
	of the NTS ad	ldressed	learning.							
•	Learning Out	come	Learning (Outcomes	Learning	Indicators		Identify which ci	ross – cutting	
	for the lessor	۱,						issues, core and	transferable	
	picked and							skills, inclusivity,	, equity and	
	developed fro	om the						addressing diversity. How will		
	course specif	ication						these be addressed or		
•	Learning indi	cators	Deverente	- + - +			с ·	developed		
	tor each learn	ning	Demonstr	ate the	Provi	de samples of	t exercises	dovices good in	g and uses of	
	outcome		elements	and electron	expla	dic tronds (at		tools for measur		
			configurat	tion and use	ionic	size ionisatio	on energy and	sharing ideas in	class	
			it to expla	in the	elect	size, ionisatio	across periods	conversion of te	mnerature	
			periodic ti	rends and	2 and	13 and down	groups 1 and	from degree Cel	sius to degree	
			bond formation 2 by student teachers Fabrenheit Studentteach							
			Draw a chart to show the develop skill							
					detai	led configura	tion of the	communication,	collaboration	
					first 2	20 elements b	y student	and mutual resp	ect while	
					teach	iers.		appreciating ind	ividual	
					• Provi	de samples o	f exercises on	difference and a	bilities,	
					how	student teach	ers describe	critical thinking	and	
					two	common type	s of bonds –	responsibility th	rough careful	
					cova	ent and ionic	bonds- are	participation ing	roup work/	
					form	ed and explain	n their	discussion.		
1					chara	icteristics		1		

Topic/Title	Sub Topic	Time or Stage	Teaching and learning to ach depending on delivery mode collaborative group work or	ieve learning outcomes: selected. Teacher led, independent study
			Teacher Activity	Student Activity
Periodicity- Chemical bond and compound formation II	Periodic trends	60 minutes	Face-to-face: Tutor introduces the lesson by reviewing Studentteachers drawing on the electronic configuration of the first 20 elements.	Face-to-face: Studentteachers show their previous knowledge by drawing the electronic configuration of the first 20 elements.
			Face-to-face: In mixed groups (gender-based) of 3 members, student-teachers discuss periodic trends (atomic size, ionic size, ionisation energy and electronegativity, across periods 2 and 3, and down groups 1 and 2) and produce charts of the periodic trends of the first- 20 elements.	Face-to-face: Studentteachers discuss periodic trends (atomic size, ionic size, ionisation energy and electronegativity across periods 2 and 3, and down groups 1 and 2) and produce charts of periodic trends of the first-20 elements.
	Covalent and ionic bonds, and compound formation	60 minutes	Face-to-face: Allow studentteachers to brainstorm (in groups of 3 members of mixed intellectual ability) to come out with the formation of covalent and ionic bonding and some compound formation.	Face-to-face: Studentteachers brainstorm to come out with the formation of covalent and ionic bonds, and compound formation. Studentteachers produce samples of exercises on the description/explanation of the formation of ionic and covalent bonds and their characteristics.
	Teaching how to teach Periodicity(Coval ent and ionic bonds, and compound formation) to the Basic school learner	60 minutes	Face-to-face/E-learning opportunities: Tutor allows studentteachers to do short power point/poster presentation on how to teach Periodicity (Periodic trends, Chemical bond and compound formation) to the JH school learner (Mixed intellectual ability Groups of 3 members).	Face-to-face/E-learning opportunities: Studentteachers in groups do power point/poster presentation on how to teach Periodicity (Periodic trends, Chemical bond and compound formation) to the JH school learner.
Which cross cutting issues will be addressed or developed and how	Equity and SEN: thr establishing an inte	rough setting gro eractive and inclu	bund rules to protect vulnerable usive classroom atmosphere.	e studentteachers and
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Assessment as lear and covalent bonds 1c) Demonstrates e 3e) Employs a varie critical thinking. Assessment of lear first-20 elements. N pedagogicalconten Assessment for lear to teach Periodicity	ning: Samples of s formation and effective growing ety of instruction ning: Charts prod NTS2c) Has secur t knowledge for rning: Student te v (Periodic trends	exercises on how studentteach their characteristics. gleadership qualities in the class al strategies that encourages so duced by student-teachers on t red content knowledge, pedago the school and grade they teac eachers doing short presentations s, Chemical bond and compound	hers describe/explain ionic ssroom and widerschool. tudentparticipation and he periodic trends of the ogical knowledge and h in. ons (3-5 minutes each) on how of formation) to the Basic

	school Learner (Reflection on presentations).NTS3j) Produces and uses a variety of teaching and learning resources including ICT, toenhance learning
Teaching Learning	Pen, paper, manila cards for charts,
Resources	https://www.khanacademy.org/science/chemistry/periodic-table/copy-of-periodic-table-of-
	elements/v/valence-electrons-lewis (Accessed 22/06/2019)
Required Text (core)	Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana
	association of science teachers integrated science for senior high schools. Accra: Unimax
	MacMillan; Handbook for PD Coordinators Themes 1-10
Additional Reading List	Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers physics for senior high
	schools. Accra: Unimax Macmillan.
	Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for
	senior high schools. Accra: Unimax MacMillan.
	Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I.
	Winneba: IEDE.
	Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V., & Obeng-Ofori, D. (2011). SWL
	integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.
CPD Requirement	i. Practicing how to form chemical bonds and compounds accurately
	ii. Practicing how to analyse periodic trends accurately/correctly
	iii. Tolerating others in group work

Year of B.Ed.	2	Semest	er 1	Place of	f lesson in s	semester 1	2 3 4 5 6 7	8 9 10 11 12		
Title of Lesson		Teaching	Chemical F	quations			Lesson Duration 2 Hours			
Lesson descriptio	The less experier creative assessm specialis such pro	on is designed nees and tecl ly through ha ent. It is also sms, physical oblems.	ed to provide nnological sl ands-on exp structured and biologi	e chemistry s kills that will loratory lear to enable the cal transition	tudent-teachers enable them to te ning activities and em to learn how t s and the necessa	with the releva each chemical d effective aut to cater for ag ary pedagogica	ant learning equations hentic e grade al skills to solve			
Previous student knowledge, prior (assumed)	teacher learning	Student bonding	teachers hav and compo	e been intro und formation	oduced to the on.	e particulate natu	re of matter, r	nixtures, chemical		
Possible barriers in the lesson	to learnin	g Inability symbolio	/ to compreh c representa	end the mid tion.	croscopic beh	aviour of particle	es during chem	ical bonding for		
Lesson Delivery of support students	hosen to in	Face- to-	Practical Activity	Work- Based	Seminar	Independent Study √	e-learning opportuniti	Practicum es		
Lesson Delivery - mode of delivery support student achieving the lea	- main - main chosen to teachers ir rning	Face v Face-to- Practica reaction Indepen	face: Mixed Activity: Stu equations dent Study:	group discu udentteache Reflections	ssions and de ers carry out a and Inquiry	emonstrations on about three chem	chemical reac	tions. and write the		
 Purpose for what you was students to a serves as bas learning out expanded verthe descripti Write in full the NTS additional serves and serves as bas learning out the description out the description out the description out the NTS additional serves are serves as bas learning out the description out the description out the NTS additional serves are serves as bas learning out the NTS additional serves are serves as bas learning out the NTS additional serves are serves as bas learning out the NTS additional serves are serves as bas learning out the NTS additional serves are serves as bas learning out the NTS additional serves are serves as bas learning out the NTS additional serves are serves as bas learning out the NTS additional serves are serves as bas learning out the NTS additional serves are serves as bas learning out the NTS additional serves are se	the lesson, ant the achieve, sis for the comes. An orsion of on. aspects of ressed	Asce Prov Corr Corr Acq NTS, The 2c) Has s knowled 3e) Emp critical t	ertain the lev vide basic sk rect misconc uire pedago e Teacher: secure conte lge for the so loys a variet binking	vel of under ills for writir eptions and gic skills to t ent knowled chool and gr y of instruct	standing and ng out word o misinformat each chemica ge, pedagogio ade they tea ional strateg	writing of word o chemical equation ion about chemic al equations cal knowledge an ch in. tes that encourag	chemical equa ns cal equations d pedagogical es studentpar	tions content ticipation and		
 Learning Out the lesson, p developed fr course speci Learning ind each learning 	come for icked and om the fication icators for g outcome	Learning	g Outcomes		Learning In	dicators	lder cutt and skill equ add How add	tify which cross- ing Issues, core transferable s, inclusivity, ity and ressing diversity. , will these be ressed or eloped		
		 Den and che be a Den skill wor and sam Corr miss atio equ ider 	nonstrate av understand mical equati able to teach nonstrate ap s required for d chemical e be able to to be able to to ne. rect conception/for about che ations that a ntified	vareness ing of ons and same propriate or writing equations each misinform mical are	 Presen equation descrip reactio Provide or othe equation and de taught Presen models miscor insight PD Theme 3 	t charts on chem on and word otions of commor ns e illustrations (in er) to show chemi ons for some read scribe how such of to learners. t concept maps of s that link iceptions to new s 3, pg 63 – 81	ical Com Rese pres e-form PD T ical 30 ctions Equ can be is de refle r fr Crea thin deve mod map 37	imunication and earch: through ip work and entations 'heme 4, pg. 23- ty and Reflection eveloped from ective activities ativity and critical king are eloped in creating dels and concept ps PD Theme 5, pg		

Content of lesson picked	Sub Topic	Time or Stage	Teaching and learning to ach	ieve learning outcomes:
and developed from the			depending on delivery mode	selected. Teacher led,
			Toochor Activity	Student Activity
Teaching Chemical				
equations	Chemical	40minutes	Face-to-face: Initiate a	Face-to-face: Special-
equations	equations in		recap on previous lesson on	ability group discussions
	word form		periodicity. Put student-	on the concept of
			groups to discuss their	chemical equations and
			understanding of word	descriptions of their
			equations	understanding
	Break time	10 minutes	Break for students to relax	Students go out for
	Dreak time	10 11110000	Break for stadents to relax	breather
	Skills required	60minutes	Face-to-face/E-learning: Put	Discussion/E-learning:
	in representing		studentteachers into mixed	Demonstrate through
	chemical		groups to discuss the key	hands-on and e-
	equations		components of chemical	activities and discuss
			equations	the formation of
				compounds and
				represent the
				form
	Break time	15 minutes	Teacher breaks lecture for	Students go out for
	break time	15 minutes	relaxation	breather/interact to
				catch up on lessons
	Dealing with	55minutes	Work-based learning: Group	Work-based learning:
	misconception		student teachers into	Students work in mixed-
	s about		mixed-ability groups with	ability groups to
	chemical		instructions on how to do	enumerate identified
	reactions		identify key components	misconceptions in class.
			that could be missed out in	
			writing equations	Watch videos/computer
				simulations on how to
			Provide web addresses and	write word equations
			links for videos and	Produce concept maps
			computer simulations on	of common
			writing word equations	misconceptions, possible
				causes, and now to
				2 ng 121: PD Theme 5
				pg. 33.
Which cross cutting issues	Equity and SEN:	through mixed and s	ame ability group work to prot	ect vulnerable students.
will be addressed or	Student teachers	s establish an interac	ctive and inclusive learning envi	ronment through group
developed and how	work.			
Lesson assessments –	Assessment of Le	earning: End of lesso	n assessment: Reports, posters	, charts, internet-based
evaluation of learning: of,	scientific reports			
for and as learning within	2c: Has secure co	ontent, pedagogical :	and pedagogicalcontent knowle	edge for the school and
the lesson	grade they teach	i IN Cturd		
	Assessment as Le	earning: Student tea	chers presentations during gro	oup work presentation to
	NTS 1c: Demonst	iiig trates effective grow	ing leadership qualities in the	lassroom in wider school
	3e Fmnlove	a variety of instruct	ional strategies that encourage	student narticination and
	critical think	ing	ai strategies that chool age	stadent participation and
Teaching Learning	Poster paper, co	mputer with interne	t access, smart phone, tablets,	0.05M sodium hydroxide
Resources	and HCl solution	S	· · · ·	·
Required Text (core)	Abbey, T. K., Alha	assan, M. B., Ameyik	oor, K., Essiah, J. W., Fometu, E.	, & Wiredu, M.B. (2008).
	Ghana associatio	on of science teacher	rs integrated science for senior l	high schools. Accra:
	Unimax MacMilla	an. Handbook for PD	Coordinators Themes 1- 10	
Additional Reading List	Abbey, T. K., &Es	siah, J.W. (1995). <i>Gl</i>	nana association of science tead	chers physics for senior
	nigh schools. Acc	cra: Unimax Macmill	an.	touchan at the f
	ameyibor, K., & '	wireau, NI. B. (2006)). Gnana association of science	teucners, chemistry for

	senior high schools. Accra: Unimax MacMillan. Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.
CPD Requirement	Training in writing word equations

Yea	ar of B.Ed.	2	Sem	ester	1 Plac	e of lesson in semester		semester	1 2 3 4 5 6 7 8 9 10 11 12		10 11 12
Title	e of Lesson		Teaching Chemical Reactions Lesson Duration 3 Hours								
Less	son descriptio	n	The lesson is designed to provide chemistry student-teachers with the relevant learning experiences and technological skills that will enable them to teach chemical reactions creatively through hands-on exploratory learning activities and effective authentic assessment. It is also structured to enable them to learn how to cater for age grade specialisms, physical and biological transitions and the necessary pedagogical skills to solve such problems as they perform practical estimations (2b, 8, a) 2a, 8, 2ii NUTCOT a 20).								
Prev	vious student		Student-tea	chers have	been introc	luced t	to the part	iculate nature	of m	natter, mixtures, c	hemical
tead	cher knowledg	e,	bonding, co	mpound fo	rmation and	d how t	to write wo	ord chemical o	quat	tions, with justifica	ation.
prio	or learning		0,	•					•		
(ass	umed)										
Pos	sible barriers t	:0	Inability to	compreher	d the micro	scopic	: behaviou	r of particles o	uring	g chemical bondin	g, their
lear	ning in the les	son	symbolic re	presentatio	n and ensu	ring en	tities (ions	, atoms, and i	nolec	cules) are balance	d.
Less	on Delivery		Face-to-	Practical	Work-Bas	ed S	eminar	Independen	t	e-learning	Practicum
cho	sen to support	t	face √	Activity	Learning	·		Study		opportunities √	
stuc	dents in achiev	ving		V							
the	outcomes										
Less	son Delivery –		Face-to-face: Ivitxed group pyramid discussions and demonstrations on chemical reactions.								
mai	n mode of		Practical Activity: Student-teachers carry out about three chemical reactions and write the								
cup	very chosen it	,		uations	s: Vidoo cin	aulatio	ns and pro	contations			
tea	chers in achiev	ing		pportunitie	S. VIUEU SIII	iulatio	nis and pre	sentations.			
the	learning										
out	comes.										
•	Purpose for til lesson, what want the students to achieve, serve as basis for th learning outcomes. Ar expanded version of the description. Write in full aspects of the NTS addresse	he you es he i 2 2 d	 Ascertain the level of understanding and writing of word chemical equations Correct misconceptions and misinformation about chemical equations Provide basic skills for writing out symbolic (representational)chemical equations and balancing them Acquire pedagogic skills to teach learners how to write and balance chemical equations, using the inspection or other innovative method NTS: The Teacher: 2b) Has comprehensive knowledge of the official school curriculum including learning outcomes 2c) Has secured content knowledge, pedagogical knowledge and pedagogicalcontent knowledge for the school and grade they teach in. 3e) Employs a variety of instructional strategies that encourages studentparticipation and critical thinking. 3l) Listens to learners and gives constructive feedback. 						nd :ions, using utcomes towledge nd critical		
•	Learning Outcome for lesson, picked and develope	the d	Learning O	utcomes		Lear	ning Indica	ators	lder Issu skill issu will	ntity which cross- les, core and trans ls, inclusivity, and les to address dive these be develop	cutting sferable equity ersity. How ped

 Demonstrate understanding of word chemical equations and be able to teach same Demonstrate knowledge of chemical symbols that make up given compounds and be able to teach same. Correct misconception/misinformati on about chemical equations that are identified Balance given chemical equations in symbolic form (using the inspection method) adding correct coefficients where necessary, with in the Ufficulty 			 Explain key components necessary for writing word equations Provide knowledge (in e-form or other) of chemical compounds and their constituents Present concept maps or models that link misconceptions to new insights PD Theme 3, pg 63 – 81 Explain the processes for balancing chemical equations and exhibit them 	Communication and presentation skills PD Theme 4, pg. 23-30 Equity and Reflection is developed from reflective activities Creativity and critical thinking are developed in creating models and concept maps PD Theme 5, pg 37 Write chemical equations for different types of reactions and balance them using inspection method. Communication, analytical, deductive and reflective skills developed Manipulative, analytical,
	 Justification Perform practical neutralisation and equation 	activity on d balance	 Orrectly with reasons Provide balanced equation (in symbolic form) from practical activity 	reflective skills developed
Content of lesson picked and developed from the course specification	Sub Topic	Time or Stage	Teaching and learning to ac depending on delivery mod collaborative group work of	hieve learning outcomes: e selected. Teacher led, r independent study
			Teacher Activity	Student Activity
Topic Title Teaching Chemical Reactions	Chemical equations in word form	40minutes	Face-to-face: Put studentteachers into special-ability groups to discuss their understanding and practice of word equations and encourage them to identify elemental constituents	Face-to-face: Special-ability group discussions on the concept of chemical equations and provide word descriptions of their understanding
	Dealing with misconceptions about chemical reactions (Subtly introduce symbolic representations)	40 minutes 50minutes	Work-based learning: Group student teachers into differentiated groups with instructions on how to do identify key components that could be missed out in writing equations Provide web addresses and links for videos and computer simulations on writing word equations Face-to-face/E-learning:	Work-based learning: Students work in differentiated groups enumerate identified misconceptions in class. Watch videos/computer simulations on how to write word equations Produce concept maps of common misconceptions, possible causes, and how to correct them PD Theme 3, pg. 121; PD Theme 5, pg. 33. Discussion/E-learning:
	representing chemical equations Balancing chemical equations in symbolic form from practical activities	50minutes	Put studentteachers into mixed groups to discuss the key components of chemical equations Work-based learning: Group student teachers into mixed-ability groups with instructions on how to carry out a practical	Demonstrate through hands-on and e-activities and discuss the formation of compounds with representation in symbolic form. Produce laboratory reports from exercises and activities on balanced chemical equations.

	balanced equations								
	Provide web addresses								
	and links for videos and								
	computer simulations on								
	symbolic chemical word								
	equations								
Which cross cutting	Equity and SEN: through mixed and same ability group work to protect vulnerable students.								
issues will be	Student teachers establish an interactive and inclusive learning environment through group work.								
addressed or									
developed and how									
Lesson assessments –	• Assessment of Learning: End of lesson assessment: Reports, posters, charts, internet-based								
evaluation of	scientific reports								
learning: of, for and	NTS 2b) Has comprehensive knowledge of the official school curriculum, including learning								
as learning within the	outcomes.								
lesson	NTS 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content								
	• Assessment as Learning: Student teachers' presentations during group work to assess their								
	learning								
	NTS3e) Employs a variety of instructional strategies that encourages student participation and								
	critical thinking.								
	NTS 3I Listens to learners and gives constructive feedback.								
Teaching Learning	Balancing chemical equations Worksheet, computer with internet access, smart phone, tablets,								
Resources	0.05M sodium hydroxide and HCl solutions.								
Required Text (core)	Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008).								
	Ghana association of science teachers integrated science for senior high schools. Accra: Unimax								
	MacMillan; JHS Science Curriculum; Handbook for PD Coordinators Themes 1-10								
Additional Reading	Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers physics for senior high								
List	schools. Accra: Unimax Macmillan.								
	Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers, chemistry for senior								
	high schools. Accra: Unimax MacMillan.								
	Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I.								
	Winneba: IEDE.								
	Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V.& Obeng-Ofori, D. (2011). SWL								
	integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.								
CPD Requirement	Training in writing and balancing representational (symbolic) chemical equations and training in								
	the use of pyramid discussions.								
	Training in the use of micro science equipment for chemistry activities.								

Yea	ar of B.Ed.	2	Semester 1 Place of lesson in semester			ester 123	er 1234 5 6789101112				
Title	e of Lesson		Teaching Nature of Solutions Lesson Duration 3 Ho								
Less	on description	١	In this lesson, Tutor discusses Nature of Solutions with studentteachers. Basically, Types of solutions (Unsaturated, Saturated, and Supersaturated) and how to form/measure the different concentrations of solutions (percent by weight, mole fraction, molarity, parts per million, parts per billion) will be looked at. This lesson will help studentteachers to recognize the composition of many solutions and most common way to express concentration. This lesson will further enable								
Prev teac prio (ass	Previous student teacher knowledge, prior learning (assumed) Student teachers are aware that a mixture of solute and solvent constitutes a solution.										
Poss lear	sible barriers t ning in the les	o son	Studentteach Have that Not satur solut	ers may: e meanings of may be diffe have the sk rated, and s cions) to the	of Types of Sol rent from the o ills in teaching upersaturated Basic School le	utions and wa descriptions that nature of So and how to arner	y of expressing at scientists use lutions I (Type form/measure	concentrations of s of solutions- u different concer	of solutions nsaturated, ntrations of		
Less chos	son Delivery – sen to support	t	Face-to-face √	Practical Activity √	Work- Based	Seminars	Independent StudyV	e-learning opportunities	Practicum		
stud the	outcomes	ving			Learning			V			
Less mod chos stud achi outo	on Delivery – de of de sen to su dent teacher ieving the lea comes.	main livery pport rs in arning	Face-to Face: machines Practical Activ Independent S e-learning opp	Discussion, T ity: Practical Study: Inquiry portunities: U	utor and stude manipulation o and reflectior lse of internet,	ntteachers' int of simple mach ns simulations an	eractions on the ines d video present	e functions of sim ations	ple		
•	Purpose for lesson, what want the stu to achieve, s as basis for learning outcomes. expanded ve of the descrip Write in aspects of the addressed	the you dents serves the An ersion stion. full e NTS	 Proper sci form/mea Demonstress NTS: The Teac 2c) Has secured the school and 3e) Employs a thinking. 3l) Listens to be 	 Proper scientific description of the characteristics of solutions and how to measure the form/measure different concentrations of solutions Demonstrate the skill and knowledge to teach the subject matter NTS: The Teacher: 2c) Has secure content knowledge, pedagogical knowledge and pedagogicalcontent knowledge for the school and grade they teach in. 3e) Employs a variety of instructional strategies that encourages studentparticipation and critical thinking. 3l) Listens to learners and gives constructive feedback. 							
•	Learning Outo for the lesson picked and developed fro	come , om	Learning Outcomes Learning Indicators Identify which cross – cutting issue core and transferable skills, inclusi equity and addressing diversity. He will there he addressed to address in the second transferable skills in the second transferable skills.						; issues, nclusivity, ity. How eveloped		
•	the course specification Learning indic for each learn outcome	cators ling	Describe to character solutions to measur concentra quantitati important	the istics of and how re their itions vely, ce(NTS 2c)	Engage in and expe- learning prepare s different concentr facilitate inclusive grade cla	n collaborative riential approaches to solutions of ations to learning in an and multi- ssroom.	Proper skills different cor class, studen communicat mutual respo individual dir thinking and careful parti work/discuss	of preparing solu acentrations, shar tteachers develo ion, collaboratior ect while apprecia ference and abili responsibility the cipation in group sion.	tions of ing ideas in p skills of and ating ties, critical rough		

Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcome depending on delivery mode selected. Teacher lea collaborative group work or independent study		
			Teacher Activity	Student Activity	
Teaching Nature of Solutions	Types of solutions (Unsaturated, Saturated, Supersaturated)	60 minutes	Face-to-face: Tutor introduces the lesson by reviewing Student teachers relevant previous knowledge on Solutions.	Face-to-face: Student teachers come out with their previous knowledge on Solutions.	
			Face-to-face: Open-ended questions to elicit misconceptions/incorrect ideas about Solutions (Types and how to form/measure different concentrations of solutions)	Face-to-face: Student teachers answer open- ended questions to bring their incorrect ideas on solutions (Types and how to form/measure different concentrations of solutions)	
			Face-to-face: Tutor allows studentteacher to form mixed groups (intellectual ability) of 3 members to discuss the types of solutions that can be formed by mixing solutes and solvents (Unsaturated, Saturated, and Supersaturated). Studentteachers should produce a written report on how types of solutions are formed.	Face-to-face: Student teachers in mixed groups (gender-based) of 3 members discuss about the arrangement of electron around the central nucleus of an atom. Studentteachers produce a written report on how types of solutions are formed.	
	Express concentration of a solution (percent by weight, mole fraction, molarity, parts per million, parts per billion)	60 minutes	Practical Activity/E- learning: Tutor allows studentteacher to from mixed groups (gender- based) of 3 members to discuss about how different concentrations of solutions are formed/ measured (percent by weight, mole fraction, molarity, parts per million, parts per billion). Student-teachers should produce videos narrating how different concentrations are formed/measured.	Practical Activity/E-learning: In mixed groups (gender- based) of 3 members, student-teachers discuss how different concentrations of solutions are formed/ measured (percent by weight, mole fraction, molarity, parts per million, parts per billion). Student-teachers produce videos to narrate how different concentrations are formed/measured.	
	How to Teach Solution I (Types of solutions- unsaturated, saturated, and supersaturated, and how to form/measure/prepare different concentrations of solutions)to the Basic school learner	60 minutes	Face-to-face/E-learning opportunities: Tutor allows studentteachers to do short power point/poster presentation on how to teach Solutions(Types of solutions- unsaturated, saturated, and supersaturated, and how to form/measure different concentrations of	Face-to-face/E-learning opportunities: Studentteachers in groups of 3 members (Mixed intellectual ability Groups), do power point/poster presentation on how to teach Solutions (Types of solutions- unsaturated, saturated, and supersaturated, and how to	

			solutions)to the Basic	form/measure different				
			school learner (Mixed	concentrations of				
			intellectual ability Groups	solutions)to the Basic school				
			of 3 members).	learner.				
Which cross cutting	Equity and SEN: through s	etting ground	d rules to protect vulnerable st	udentteachers and				
issues will be	establishing an interactive	and inclusive	e classroom atmosphere. By p	racticing with the preparation				
addressed or	of solutions of different co	oncentrations	s, studentteachers' difficulties	in skills of				
developed and how	forming/measuring/prepa	ring differen	t concentrations of solutions w	vill be addressed.				
Lesson assessments –	Assessment of learnin	ng: Written re	eports produced by studenttea	chers on how types of				
evaluation of learning:	solutions are formed.							
of, for and as learning	NTS 2c:Has secure cor	ntent knowle	dge, pedagogical knowledge a	nd pedagogical content				
within the lesson	knowledge for the sch	nool and grad	le they teach in					
	Assessment as learnir	ng: Videos pro	oduced by student-teachers or	n practical activity of				
	forming/measuring di	ifferent conce	entrations of solutions.					
	 NTS 3e: Employs a vai 	riety of instru	actional strategies that encoura	ages student				
	participation and criti	cal thinking.						
	Assessment for learni	ng: Teachers	doing short presentations (3-5	5 minutes each) on how to				
	teach Solution I (Type	es of solutions	s- unsaturated, saturated, and	supersaturated, and how to				
	form/measure different concentrations of solutions) to the Basic school (Reflection on							
	presentations).							
	NTS 3I: Listens to lear	ners and give	es constructive feedback.					
Teaching Learning	Pen, paper, manila cards f	or charts, sal	ts, sugar, water, beakers, stirri	ng rods.				
Resources								
Required Text (core)	Abbey, T. K., Alhassan, B.	, Ameyibor,	K., Essiah, J. W., Fometu, E.,	& Wiredu, M.B. (2008). <i>Ghana</i>				
	association of science tead	chers integra	ted science for senior high sch	ools. Accra: Unimax MacMillan;				
	Handbook for PD Coordina	ators Themes	5 1- 10					
Additional Reading List	Abbey, T. K., &Essiah, J.W	/. (1995). Gha	ana association of science teac	hers physics for senior high				
	schools. Accra: U	Jnimax Macm	nillan.					
	Ameyibor, K., & Wiredu, N	И. В. (2006). (Ghana association of science to	eachers' chemistry for senior				
	high schools. Acc	cra: Unimax N	MacMillan.					
	Asabere-Ameyaw, A., & O	ppong, E. K. ((2013). Integrated science for t	he basic school teacher I.				
	Winneba: IEDE.	D No. 1		Of				
	Uddoye, E. U. K., Taale, K.	D., Ngman-V	vara, E., Samlato, V., & Obeng-	Otori, D. (2011). SWL				
CDD Demuinement	Integrated scienc	te jor senior i	nigri schools: Students book. A	tions of colutions a second to.				
CPD Requirement	i. Practicing now to draw	iorm/measu	ire/prepare different concentr	ations of solutions accurately				
	II. I Olerating others in gro	oup work						

Ye	ar of B.Ed.	2	Semester	1	Place of les	son in sei	nester	1 2 3 4 5 6 7 8 9 10 11 12					
Titl	e of Lesson		Course Review	1 and STS	Seminar		Less	Lesson Duration 3 Hours					
Les	son description	n	To review and	audit the l	essons for the f	irst half of t	the semester.	ester. It is also expected that					
	• • • •		studentteache	rs will refle	ect during this le	esson on th	eir own progi	ess in the course	so far.				
Pre	vious student	acnes.											
tea	cher knowledg	ge, Sumod)											
Por	sible barriers t	to	Misconcention	on some	concents not a	dequately d	ealt with and	lesson inadequat	oly				
lea	rning in the les	son	understood by	studentte	achers	lequately u			eiy				
Les	son Delivery –	chosen	Face-to-face	Practical	Work-	Semina	Independer	t e-learning	Practicum				
to	support studen	ts in	v v	Activity	Based	rs √	Study √	opportunitie	s				
ach	ieving the out	comes	-	√ √	Learning			V					
Les	son Delivery –	main	Face-to-face:	Discussion,	Demonstration								
mo	de of delivery	chosen	Independent S	tudy: Refl	Reflections, Modelling concept maps and cartoons								
tos	support studen	t	Seminar: Presentations of models, cartoons and maps of the concepts										
tea	chers in achiev	ing the	e-learning opportunities: Computer simulations and OERs on content and teaching activities for										
lea	rning outcome	s.	contents.										
•	Purpose for t	he	Ascertain	the level o	funderstanding	g of concept	ts.						
	lesson, what	you	Test vario	 Test various skills and cross-cutting issues 									
	want the stud	dents	Provide re	Provide remedial tuition where necessary									
	to achieve, se	erves as	Correct misconceptions and misinformation										
	basis for the		 Build the necessary support going forward on SEN and Gender issue 										
	learning outc	omes.											
	An expanded		NTS:	NTS:									
	version of the	5	2c) Has se	cure conte	nt knowledge,	pedagogica	l knowledge a	and pedagogical co	ontent				
	description.		knowledge	e for the so	hool and grade	they teach	in						
•	Write in full a	spects	3j:.Produc	es and use	s a variety of te	eaching and	learning reso	urces including IC	T, to enhance				
	of the NIS		learning.										
	addressed		Loarning Outo	omoc		ators	Ido	tify which cross of	utting Issues				
•	for the losson	come		Jilles	Learning mult	ators		and transferable	skills equity				
	nicked and	ι,					and		address				
	developed fro	om the					dive	diversity. How will these be					
	course specifi	ication					add	ressed or develop	ed?				
•	Learning indi	cators	Identify		Make a lis	t of weakne	esses Coll	aborations, Comn	nunication and				
	for each learn	ning	weaknesse	es and	and stren	gths on pos	ter Res	earch through gro	up work and				
	outcome	-	strengths	in	papers for	r sharing PD	pre	sentation					
			learning th	ne	Theme 4,	pg 111	Equ	ity and Reflection	is developed				
			science les	son for	• Provide a	reflective r	eport fror	n reflective activit	ies PD Theme				
			the period	under	and answ	er question	s on 1. P	g 12-15; pg 41					
			review		topics lea	rnt so far th	rough Cre	ativity and critical	thinking are				
			 Reflect on 	lessons	demonstr	ations and	dev	eloped in develop	ing models				
			learnt so f	ar and	illustratio	ns on a give	n and	concept maps					
			state new	insights	media								
			and/or gre	ey areas	Present co	oncept map	S						
			needing re	emedies	and/or mo	odels linking	g						
			Correct		misconce	otions/misii	ntorm						
			misconcep	otion/mi	ation to n	ew insights							
			sinformati	un ior									
				5011 1 -									
			57 10350115										

Content of lesson picked and developed from the	Sub Topic	Time or Stage	Teaching and learning to ach on delivery mode selected. T	ieve learning outcomes: depending eacher led. collaborative group
course specification			work or independent study	
Topic Title			Teacher Activity	Student Activity
Course Review 1 and STS			Facilitate and provide the	
Seminar			necessary tools for	
	Deviewing	FO minutes	students' activities.	
	Reviewing	50 minutes	Face-to-face: Lutor led	Face-to-face:Student teachers
	Periodicity		student teachers to unearth	previous lessons and provide a
	chemical		the weaknesses and	checklist identifying and recording
	bonding,		strengths of student	all possible weaknesses and
	compound		teachers in lessons 1-5.	strengths
	formation,		Initiate discussion /Talk for	
	and		learning approach using	
	chemical		groupings (Differentiated	
	equations		groups) to identify student	
			weakness in the lessons	
			learnt so far.	
	Break time	10 minutes	Teachers allows 10-minute	Student teachers take a break
			break for students'	
			relaxation	
	Davidiante	10	Free to Free Tates and a	Free to Free Charlente work in the
	Remedies to	40minutes	Face-to-Face: Tutor groups	Face-to-Face: Students work in the
	topics		to remedy need and	group) on tasks to remedy their
			provide specific task	learning need. They then present
			assistance in the areas on	concept maps and/or models
			concept needing remedy	linking
				misconceptions/misinformation to
	Ducalitions	20 minutes	Taa ah ara allawa 20 minuta	new insights
	вгеак time	20 minutes	heak for students'	Student teachers take a break
			relaxation	
	Discussion	60 minutes	Seminar: Tutor allows two	Seminar:Student teachers listen to
	of		or three resource persons	various presentations. Student
	s during STS		STS based on the NTS Tutor	made during STS based on the
	s during 515		then guides student	National Teacher's Standards.
			teachers through problem-	reflect and provide a checklist of
			based learning on National	lessons learned and problems
			Teacher's Standards and	identified and how they can be
			reflection on observations	addressed.
			made during STS	Student teachers then provide a
Which cross cutting	Equity and SFI	l N: through mixe	d and same group work to prot	ect vulnerable Student-teachers and
issues will be addressed	establishing a	n interactive an	d inclusive classroom atmosphe	ere.
or developed and how	Through mode	elling and group	work, collaboration is establis	ned.
Lesson assessments –	Assessme	nt as learning: S	Student teachers' presentations	s during group work and model work
evaluation of learning:	presentat	ion helps to ass	ess their learning (Presentatior	ns to last for each group a 3-5mins)
ot, for and as learning	Working in	n groups.	at knowledge, nedegegiest know	vladge and nodagogical content
	knowledg	e for the school	and grade they teach in	meage and pedagogical content
	 Assessme 	nt of learning: S	Studentteachers working in gro	ups on remedial tutoring helps to
	assess the	em for learning		
	NTS 3j: Pr	oduces and use	s a variety of teaching and lear	ning resources including ICT, to
	enhance	earning		
	 written a 	ssessment will i	be used to assess as learning	

Teaching Learning	JHS Science Syllabus								
Resources									
Required Text (core)	Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008).								
	Ghana association of science teachers integrated science for senior high schools. Accra: Unimax								
	MacMillan. Handbook for PD Coordinators Themes 1-10								
Additional Reading List	Abbey, T. K., &Essiah, J.W. (1995). Ghana association of science teachers physics for senior high								
	schools. Accra: Unimax Macmillan.								
	Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teacher's chemistry for senior								
	high schools. Accra: Unimax MacMillan.								
	Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I.								
	Winneba: IEDE.								
	Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V.& Obeng-Ofori, D. (2011). SWL								
	integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.								
CPD Requirement	Training on preparation of checklist, reflection guides and pyramid discussions								

Ye	ar of B.Ed.	2	Semester 1 Place of lesson in semest						1 2 3 4 5 6 7 8 9 10 11 12			
Titl	e of Lesson		Teaching	Solubility					Lesson Durat	ion	3 Hours	
Les	son descriptior	ו	s as recap and li e conceptual un can be dissolved hould be able to tly, this lesson v H school learner	hks it with solubilit derstanding of solu d in a given amound identify factors/co vill enable studentt	y and fac bility as t of solve nditions reachers	etors a ent to that teach						
Pre tea pric (ass	vious stu cher knowl or lea sumed)	udent edge, rning	Studentteachers are conversant with the how types of solutions are formed and can prepare solutions of different concentrations.									
Pos lea	sible barriers t rning in the les	o son	 Studentteachers may: Have misconceptions on solubility and the factors that affect solubility Not have the skills in teaching Nature of Solutions II (solubility and factors affecting solubility) to the Basic School learner 									
Les cho stue the	son Delivery – osen to support dents in achiev outcomes	: ring	Face-to- face √	Practical Activity V	Worl Base Lear	k- d ning	Seminars	Independent StudyV	e-learning opportunities √	Practio	cum	
Les mo cho stuo ach out	son Delivery – de of de sen to su dent teacher ieving the lea comes.	main livery pport s in rning	Face-to Face: Discussion, Tutor and student-teachers' interactions on the functions of simple machines Practical Activity: Practical manipulation of simple machines Independent Study: Inquiry and reflections e-learning opportunities: Use of internet, simulations and video presentations									
•	Purpose for lesson, what want the stu- to achieve, s as basis for learning outcomes. expanded ve of the descrip Write in aspects of the	the you dents erves the An ersion tion. full e NTS	 Proper scientific description of Solubility Correct identification of factors/conditions that affect the solubility of solutes. Demonstrate the skill and knowledge to teach the subject matter NTS, The Teacher: 1a) Critically and collectively reflects to improve teaching and learning 2c) Has secure content knowledge, pedagogical knowledge and pedagogicalcontent knowledge for the school and grade they teach in. 									
addressed Learning Outcome Learning Indicators Identi for the lesson, picked and inclus inclus developed from diverse addressed inclus					entify which cross- re and transferable clusivity. Equity an versity. How will th ldressed or develop	entify which cross-cutting Issues, re and transferable skills, lusivity. Equity and addressing rersity. How will these be						
•	specification Learning indicators for learning outco	each ome	 Demo and u the e temp size a solub 	onstrate kno inderstandir ffects of erature, par nd agitatior ility. (NTS 20	owledgong on rticle n on c, 2c)	e •	Provide a ch how tempe particle size agitation af solubility	nart on In rature, sc and st fect cc m in cr th w	identifying factors lubility and sharing udent-teachers dev mmunication, colla utual respect while dividual difference itical thinking and n rough participation ork/discussion.	that affe g ideas in velop ski aboratio e appreci s, abilitie responsil n in grou	ect i class, Ils of n and ating es, bility p	

Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group						
			work or independent study						
		-	Teacher Activity	Student Activity					
Teaching Solubility	Solubility	60 minutes	Face-to-face: Tutor introduces the lesson by reviewing student teachers previous knowledge on Nature of Solutions (types of Solutions and formation/measuring/ preparation of solutions of different concentrations).	Face-to-face: Student teachers disclose their previous knowledge on Nature of Solutions II (types of Solutions and formation/measuring/ preparation of solutions of different concentrations					
			Face-to-face: Open-ended questions to elicit misconceptions/incorrect ideas about Nature of Solutions II (types of Solutions and formation/measuring/ preparation of solutions of different concentrations).	Face-to-face: Studentteachers answer open-ended questions to bring their incorrect ideas on Nature of Solutions II (types of Solutions and formation/measuring/ preparation of solutions of different concentrations).					
			Face-to-face: Tutor allows studentteacher to form mixed groups (gender-based) of 3 members to discuss about the solubility of different solutes. Studentteachers should produce written reports on the meaning of solubility.	Face-to-face: Student teachers in mixed groups (gender-based) of 3 members discuss about the solubility of different solutes. Studentteachers produce written reports on the meaning of solubility.					
	Factors that affect Solubility(temp erature, pressure stirring and particle size).	60 minutes	Practical Activity: Tutor allows studentteachers to from mixed groups (gender-based) of 3 members to identify the factors (temperature, pressure stirring and particle size) that affect the solubility of some known solutes and produce charts on these factors	Practical Activity: In mixed groups (gender-based) of 3 members, perform activities the factors (temperature, pressure stirring and particle size) that affect the solubility of a known solute. Student-teachers produce charts on factors that affect solubility of solutes.					
	How to teach Solubility and Factors affecting Solubility to the Basic school learner	60 minutes	Face-to-face/E-learning opportunities: Tutor allows studentteachers to do short power point/poster presentation on how to teach Solubility and Factors affecting Solubilityto the Basic school learner (Mixed intellectual ability Groups of 3 members).	Face-to-face/E-learning opportunities: Studentteachers in groups of 3 members (Mixed intellectual ability Groups), do power point/poster presentation on how to teach Solubility and Factors affecting Solubility to the Basic school learner.					
Which cross cutting	Equity and SEN: 1	through setting	ground rules to protect vulnerable s	tudentteachers and					
issues will be	establishing an interactive and inclusive classroom atmosphere. By practicing with the								
addressed or	determination and identification of the solubility of solutes and factors that affect solubility,								
developed and how	studentteachers'	difficulties in ic	dentification and practicing skills of t	he solubility will be addressed.					
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Assessment as Le solubility. NTS 1a: Critically Assessment for le solubility of solut	earning: Writter and collectively earning: Studen tes.	n reports produced by studentteacher y reflects to improve teaching and le tteachers producecharts on the fact	ers on the meaning of arning. ors/conditions that affect					

	NTS 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in
	Assessment of learning: Student teachers makeshort presentations (3-5 minutes each) on how to
	teach Solubility and factors/conditions affecting solubility of solutesto the Basic school (Reflection
	on precentations)
	NTC 2: Use secure content knowledge, nodegogical knowledge and nodegogical content
	INTS 2C. Has secure content knowledge, pedagogical knowledge and pedagogical content
	Knowledge for the school and grade they teach in.
Teaching Learning	Pen, paper, manila cards for charts, salts, sugar, water, beakers, stirring rods, heater/burner.
Resources	
Required Text (core)	Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana
	association of science teachers integrated science for senior high schools. Accra: Unimax
	MacMillan; Handbook for PD Coordinators Themes 1- 10
Additional Reading List	Abbey, T. K., &Essiah, J.W. (1995). Ghana association of science teachers physics for senior high
	schools. Accra: Unimax Macmillan.
	Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for senior
	high schools. Accra: Unimax MacMillan.
	Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I.
	Winneba: IEDE.
	Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V., & Obeng-Ofori, D. (2011). SWL
	integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.
CPD Requirement	 Practicing how to determine solubility of solutes correctly/accurately.
	Tolerating others in group work

Ye	ar of B.Ed.	2	Sem	ester	1	Place of lesson in semester		1 2 3 4 5 6 7 8 9 10 11 12				
Titl	e of Lesson		Teaching	T Colloids I					Lesson Duration	a 3 hours		
	<u> </u>		Teaching					1.1				
Les	son descriptioi	า	This less	on deals wi	th the	concep	ot of colloids an	d their properti	es and the types.			
Pre	vious student		Student	teachers ha	ve had	l encou	nters with solu	tions of various	kinds.			
tea	cher knowledg	je,										
pric (ase	sumed)											
Pos	sible barriers t	:0	Miscon	ception abo	ut coll	oids.						
learning in the lesson												
Les	son Delivery –		Face-	ace- Practical Work- Seminars V Independent e-learning Practicur								
cho	sen to support	t	to-	Activity	Base	d		Study √	opportunities			
stu	dents in achiev	ving	face V	٧	Lear	ning			V			
the	outcomes		Consta			<u></u>		:1:4				
Les	son Delivery –	main	Face-to-	Face: Discu	ssion, :	Same a	bility, mixed ac	and gender	based group works	.		
cho	sen to support	ŀ	Indepen	dent Study	Tutor	and st	udentteacher r	eflections (indiv	idually and collectiv	elv) and		
student teachers in inquiry									ciy) and			
achieving the learning e-learning Opportunities: OERs and Video presentations												
outcomes.												
•	Purpose for t	he	Appreciate the Nature of Colloids									
	lesson, what	you	Cor	rect miscon	ceptio	ns and	misinformatior	n about colloids				
	want the stud	lents										
	as basis for th	rves										
	learning outc	omes.	NTS The	• Teacher								
	An expanded		2c) Has	secure cont	ent kn	owledg	e. pedagogical	knowledge and	pedagogicalconten	t knowledge		
	version of the	2	, for the s	chool and g	grade t	hey tea	ich in.	0		0		
	description.		3e) Emp	loys a varie	ty of ir	nstructi	onal strategies	that encourage	s studentparticipati	on and critical		
•	Write in full a	spects	thinking									
	of the NTS											
	Jearning Out	omo	Learning	Outcomes		lear	ning Indicators		Identify which cr	nss — cutting		
	for the lesson		Learning	Jucomes		Lean	ing multators		Issues, core and t	ransferable		
	picked and	<i>''</i>							skills, inclusivity.	Equity and		
	developed fro	om							addressing divers	ity. How will		
	the course								these be address	ed or		
	specification								developed			
•	Learning indic	ators	• Expl	ain the con	cept	• 1	Present concep	t maps of the	Collaborations, Co	ommunication		
	for each learn	ning	of co	olloids		(concept of collo	bids	and Research: Th	rough group		
	outcome		Desc	cribe the		•	viake a chart of	the colloids	Fourty and Pofloc	auon tion is		
			prop	verties OT bids			properties of the	t mans and /or	developed from r	eflective		
			• Stat	e some		.	nodels linking	t maps and/or	activities			
			misc	conceptions	;		nisconceptions	/misinformati	Creativity and crit	ical thinking is		
			pup	ils might ha	ve		on to new insig	hts	developed in developed	eloping		
			cono	cerning coll	oids				models and conce	ept maps		

Content of lesson picked and developed from the course specification	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study					
Topic Title	-		Teacher Activity	Student Activity				
			Facilitate and provides the					
			students activities.					
	Concepts on	30 minutes	Face-to-Face:	Face-to-Face:Student				
Colloids I	colloid formation		Brainstorming with student teachers to	teachers observe various				
			introduce concepts. Use	nature of the solutions to				
			idea about solutions,	distinguish between colloids				
			suspensions and others to	and other solutions				
			misconceptions (thick					
			blurred soapy solutions)					
		90minutes						
			discussion /Talk for groups and with the discussion					
			learning approach using	studentteachers identify the				
			groupings (Same ability	how colloids are formed.				
			identify colloids and how	some prepared samples of				
			they are formed colloids	colloids as evidence of how				
			The groups are provided	colloids are formed.				
			for sample preparations of					
			colloids					
	Types of colloids	60minutes	Group student teachers	Students work in groups and				
			according to mixed ability	discuss types of colloids and present a report each				
			take discuss the types of					
			colloids and present a					
Which cross cutting	Equity and SEN: thr	ough mixed and s	report.	Inerable student teachers and				
issues will be addressed	establishing an inte	ractive and inclus	ive classroom atmosphere.					
or developed and how	Through modelling	and group work, o	collaboration is established.					
Lesson assessments –	 Assessment as NTS 2c: Has so 	Learning: Student	t teachers present concept ma	ps for assessment as learning				
of, for and as learning	 knowledge for 	the school and gra	ade they teach in.					
within the lesson	Assessment for	r learning: Student	t teachers working in groups a	nd presenting report				
	NTS 3e: Employ	ys a variety of inst	ructional strategies that enco	urages studentparticipation				
Teaching Learning	Cardboards, Course	iking. Manual						
Resources								
Required Text (core)	Abbey, T. K., Alhass	an, M. B., Ameyib	or, K., Essiah, J. W., Fometu, E	., & Wiredu, M.B. (2008).				
	Gnana association of MacMillan.	of science teacher.	s integrated science for senior	nign schools. Accra: Unimax				
Additional Reading List	Abbey, T. K., &Essia	h, J.W. (1995). <i>Gh</i>	ana association of science tec	chers physics for senior high				
	schools. Accra: Unir	max Macmillan.						
	Ameyibor, K., & Wi	reau, M. B. (2006) ' Unimax MacMilla	i. Gnana association of science an	e teacners cnemistry for senior				
	Asabere-Ameyaw,	A., & Oppong, E. K	(2013). Integrated science fo	r the basic school teacher I.				
	Winneba: IEDE.	-						
	Oddoye, E. O. K., Ta	ale, K. D., Ngman	-Wara, E., Samlafo, V., & Ober	ng-Otori, D. (2011). SWL				
CPD Requirement	Training on Talk for	learning approac	hes	iana, Jam-WOOde Llu.				
	-							

Ye	ar of B.Ed.	2	Ser	nester	1	Place	of lesson	in semester	1	23456789	10 11 12	
Title	e of Lesson		Teachin	g Colloids II					Le	sson Duration	3 hours	
Les	son descriptio	n	This less importa the cond	on reviews t nce of colloi cept of colloi	the cor ds. The ds to t	ncepts of e lesson o :he basic	colloids and concludes w school lear	d deals with the ith how the stud ner.	envir lent t	onmental and inc eacher can prepa	lustrial re and teach	
Pre tea pric (ass	vious student cher knowledg or learning sumed)	ge,	Student	teachers we	ere intr	oduced 1	to the conce	pt of colloids in	lesso	n 8.		
Pos leai	sible barriers t ning in the les	to ison	Misconception to some concepts not adequately dealt with. Lessons not appropriately understood by student teachers.									
Less cho stue the	Lesson Delivery – chosen to support students in achieving the outcomes		Face- to- face √	Practical Activity √	Work- Based Learning		Seminars	s √ Independent Study √		e-learning opportunities √	Practicum	
Less mod cho stud ach out	sson Delivery – main lode of deliveryFace-to-Face: Discussion, Same ability, mixed ability and gender-based group works.Practical Activity: Preparing colloids and other sample solutions.Practical Activity: Preparing colloids and other sample solutions.Independent Study: Tutor and student-teacher reflections (individually and collectively) and inquiry e-learning Opportunities: OERs and Video presentations									y) and		
•	Purpose for t lesson, what want the stud to achieve, se as basis for th learning outc An expanded version of the description. Write in full aspects of the addressed	he you dents erves ne omes. e e NTS	• App NTS, The 2c) Has for the s 3j) Prod learning	e Teacher: secure conte school and g uces and use	ndusti ent kno rade th es a va	rial and e owledge, ney teach riety of to	nvironment pedagogica i in. eaching and	al importance o l knowledge and learning resour	f colle l peda ces ir	pids agogicalcontent k icluding ICT, toen	nowledge hance	
•	b Learning Outcome Learning for the lesson, picked and developed from			Learni	ing Indica	ators	Identify which cross – cutting issues, core and transferable skills, inclusivity, equity and addressing diversity. How will these be addressed or developed			ore and nd e addressed		
•	picked and developed from the course specification Learning indicators for each learning outcome		 Desenvent al a induing of c 	cribe the ironment nd ustrial oortance olloids.	or developed the Write a reflective Collaborations, Communica nent report on Through group work and product differentiated learning on the environmental ice and industrial is. importance of colloids.					munication and R and presentation	esearch:	

Content of lesson picked and developed from the course specification	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study				
Topic Title			Teacher Activity	Student Activity			
Colloids II			Facilitate and provides the necessary tool for students activities.				
	The Environm ental and industrial importan ce of colloids	90 minutes 40minutes	The lesson should begin with a field trip to an appropriate industry, factory for student – teachers to observe some uses of colloid Initiate discussion Talk for learning approach using groupings (Same ability and then mixed groups) to discuss their reports from the field trip.	Student teachers observe various industrial uses of colloids and write reports for later discussions in the classroom Working in groups, studentteachers discuss findings from their reports from the field trips.			
	How to teach Colloids	50minutes	Group student teachers according to mixed ability and allow them to develop activities for teaching the concept of colloids	Students work in the groups to prepare activities for teaching and later do peer teaching with their activities for 10 minutes each.			
Which cross cutting issues will be addressed or developed and how	Equity and and establi Through m	SEN: through mixed shing an interactive odelling and group v	and same group work to p and inclusive classroom atr work, collaboration is estab	rotect vulnerable student - Teachers nosphere. lished.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	 Assess NTS 2c knowle Assess NTS 3j enhane 	ment for learning: S :: Has secure conten edge for the school a ment as learning: St : Produces and uses ce learning.	tudent teachers present fie t knowledge, pedagogical k and grade they teach in udent teachers work in gro a variety of teaching and le	eld trip reports for assessment nowledge and pedagogical content ups topeer teach earning resources including ICT, to			
Teaching Learning Resources	Cardboards	s, Course manual, m	arker boards				
Required Text (core)	Abbey, T. K Ghana asso MacMillan.	., Alhassan, M. B., A pociation of science te	meyibor, K., Essiah, J. W., F eachers integrated science f	ometu, E., & Wiredu, M.B. (2008). <i>For senior high schools</i> . Accra: Unimax			
Additional Reading List	Abbey, T. K schools. Ac Ameyibor, high school Asabere-Ar Winneba: I Oddoye, E. integrated	, &Essiah, J.W. (199 cra: Unimax Macmil K., & Wiredu, M. B. /s. Accra: Unimax Ma neyaw, A., & Oppon EDE. O. K., Taale, K. D., N science for senior hi	95). Ghana association of sc lan. (2006). Ghana association o acMillan. Ig, E. K. (2013). Integrated s Igman-Wara, E., Samlafo, V gh schools: Students book.	ience teachers physics for senior high of science teachers chemistry for senior ccience for the basic school teacher I. ., & Obeng-Ofori, D. (2011). SWL Accra, Ghana; Sam-Woode Ltd.			
CPD Requirement	Training on	planning for field tr	rips				

Year of B.Ed.	2	Seme	ster	1 P	lace	of lesson in	semest	er 1	L 2 3 4 5 6 7 8 9	10 11 12		
Title of Lesson		Teachin		Janger					Lesson Duration	2 Hour		
Lesson description	n	The cou	arse is desig	ned to	provic	le chemistry s	tudent te	achers v	with the relevant	learning		
		experie through discusse	nces and te hands-on es the energ	chnolo explora gy chan	gical s itory le iges ar	kills that will e earning activit nd separation	enable the ies and ef of mixture	em to te fective es with	each energy chang authentic assessn Student teachers	es creatively nent. Tutor		
Previous student	teacher	The pre	evious lesso	n was c	on colle	oids.Student t	eachers a	re fami	liar with reactions	and use		
knowledge, prior	learning	energy	on a daily b	asis.								
(assumed)												
Possible barriers t	10 1500	Studen	Studentteachers may:									
	5011	 Not have the skills in teaching energy changes to the junior highschool lead 							learner.			
Lesson Delivery –	chosen	Face-	Practical	Wor	k-	Seminars	Indepen	ndent	e-learning	Practicum		
to support studen	its in	to-	Activity	Base	d		Study√		opportunities			
achieving the out	comes	face √		Lear	ning				V			
Lesson Delivery –	main	Face-to	Face: Discu	ussion, a	group	work,						
to support studen	cnosen it	e-learni	Independent study: Reflections and Inquiry									
teachers in achiev	ing the	c icuiti	e-learning opportunities: use of internet MOOC, simulations and Video presentations									
learning outcome	s.											
Purpose for the le	• Provide opportunities for adopting a positive outlook for energy and energy changes								changes			
• Demonstrate the skill and knowledge to teach the subject matter												
students to achieve, serves as basis for the learning												
outcomes. An expanded												
version of the description. NTS, The Teacher:												
• Write in full a	spects of	1a)Critically and collectively reflects to improve teaching and learning.										
the NTS addr	essed	1b) Improves personal and professional development through lifelong learning and										
		Continu	ious Profes	sional L	evelo	pment.	~	Idontify	which cross out	tting loculos		
• Learning Out	cked and	Learnin	ig Outcome	5	Lear		5	core an	d transferable ski	lls, inclusivity.		
developed fro	om the					Equ		Equity	uity and addressing diversity. How			
course specif	ication				will			will the	ill these be addressed or developed			
Learning indi	cators for	• Demo	nstrate the	<u>,</u>		Provide a concent Correct / handling and uses of devi				es of devices		
each learning		underst	tanding of e	energy	•	map of some	сері	good id	breech nanoing and uses of devices, bod identification of tools for			
outcome		change	s	07		energy chang	es in	measu	easurements, sharing ideas in class,			
		 Desig 	n age and			nature.		conver	sion of temperatu	re from		
		develop	omentally					degree	Celsius to degree	Fahrenheit,		
		approp	riate nental mod	els or	•	Provide samp	les of	commi	inication collabor	skills of		
		designs	that can be	eused		models or des	signs	mutual	respect while app	preciating		
		to teach	h energy ch	anges		for peer revie	w and	individ	ual difference and	abilities,		
		at the J	HS			store in portfo	olio	critical	thinking and resp	onsibility		
								through the second seco	h careful participa	tion in group		
Topic/Title		Sub To	oic	Time	or	Teaching an	d learning	work/d	ieve learning out	comes:		
				Stage		depending o	n deliver	y mode	selected. Teache	r led,		
				_		collaborativ	e group w	vork or	independent stud	ly		
						Teacher Acti	vity	Stu	udent Activity			
Teaching separati	on of	Recap o	oflesson	30		Face-to-Face	: Recap	Fa	ce-to-Face: Studer	nt teachers		
mixtures		on collo	bids	minu	tes	lesson on co	lloids and	res	spond to question	s on previous		
						fink it to the	new topic energy		son and identity li lloids and energy i	nks between hanges		
				'energy and energy			collolus and energy changes					

	Energy changes	60 minutes	Face-to-Face: Provide online resources on the concept energy changes and initiates a pyramid discussion on everyday activities that involves energy changes such as lighting flames, turning the fan on. Require of student teacher to present concept maps to show the activities	Face-to=Face: Student teachers work in groups, discuss daily activities that present the examples of energy changes while developing the concept maps for review. Online links such as https://www.siyavula.com/read/sc ience/grade-11/energy-and- chemical-change/12-energy-and- chemical-change-01, https://www.youtube.com/watch? v=z8a-L1lkq3w,				
	Designing Experiments on Energy changes	90 minutes	Face-to-Face/e- learning: Provide examples of experimental models and videos for student teachers to be able to design age and developmentally appropriate experiments that can teach JHS learner. The student teacher remains in their groups and present their work in the last 30 minutes for their peers to critique it. Require of the student teachers to produce written	(Accessed on 22/06/2019) Face-to-Face/e-learning: Student teachers remain in their groups and using the examples of experimental models and videos, they discuss and design age and developmentally appropriate activities that can be used to teach JHS learner and present their work in the last 30 minutes for their peers to critique it.				
Which cross cutting issues will be addressed or developed and how	Equity and SEN: th establishing an inte available experience Energy changes.	 rough setting eractive and i ces for energ	reports for critique. g ground rules to protect vu inclusive classroom atmosp y changes will reduce stude	Lunerable studentteachers and ohere. By practicing with readily entteachers' difficulties in teaching				
Lesson assessments – evaluation of, for and as learning within the lesson	 Assessment as Learning: concept maps submitted for assessment on energy changes and peer critique on designed experiments NTS 1a: Critically and collectively reflects to improve teaching and learning. 1b) Improves personal and professional development through lifelong learning and Continuous Professional Development. 							
Teaching Learning Resources	Some resources that would be required to successfully enable an inclusive integrated science teaching would be Laboratory equipment, Chemicals, Smartphones, Tablets, Laptops, Desktop computer, Productivity tools (software that allow teachers to work better), Subject based instructional tools/applications. <u>https://www.siyavula.com/read/science/grade-11/energy-and-chemical-change/12-energy-and-chemical-change-01</u> ,							
Required Text (core)	Abbey, T. K., Alhass Ghana association Unimax MacMillan	san, B., Amey <i>of science teo</i> ; Handbook f	vibor, K., Essiah, J. W., Fom achers integrated science for or PD Coordinators Theme	etu, E., & Wiredu, M.B. (2008). <i>or senior high schools</i> . Accra: es 1- 10				

Additional Reading List	Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers physics for senior
	high schools. Accra: Unimax Macmillan.
	Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for
	senior high schools. Accra: Unimax MacMillan.
	Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I.
	Winneba: IEDE.
	Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V., & Obeng-Ofori, D. (2011). SWL
	integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.
CPD Requirement	Practicing to be familiar with experiences to use for energy changes and using online teaching
	resources
	Honesty through reporting actual method best for each mixture.

Year of B.Ed.	2	Sem	nester	1	Place	of lesson in	semester	1	23456789	10 11 12
Title of Lesson		Teaching Separation of mixtures						Less	son Duration	3 Hours
Lesson description	n	The course is designed to provide chemistry student teachers with the relevant learning experiences and technological skills that will enable them to teach separation of mixtures creatively through hands-on exploratory learning activities and effective authentic assessment. Tutor discusses the energy changes and separation of mixtures with Student teachers								rning ixtures assessment. ers
Previous student teacher knowledg prior learning (assumed)	;e,	The prev environi	The previous lessons were on energy changes.Student teachers have sorted items in their environment.							
Possible barriers t learning in the les	to ison	Student •	-teachers ma Difficulty u Not have t	ay: ising o he ski	online res ills in desi	ources gning experin	nents for JHS	S learr	ners	
Lesson Delivery – chosen to support students in achiev the outcomes	t /ing	Face- to- face √	Practical Activity	Wo Bas Lea	ork- sed arning	Seminars	Independe Study √	ent	e-learning opportunities √	Practicum
Lesson Delivery – mode of delivery chosen to suppor student teachers achieving the lear outcomes.	main t in ning	Face-to Face: Discussion, group work, Practical Activity: Manipulations of models and designing models to reflect separation of mixtures. e-learning opportunities: Use of internet MOOC, simulations and video presentations								
Purpose for the le what you want th students to achiev serves as basis for learning outcome expanded version description. • Write in full a of the NTS addressed	esson, e ve, r the s. An of the sspects	 Proper Use of Online resources to teach and Demonstrate the skill and knowledge to teach the subject matter NTS, The Teacher: 2c) Has secure content knowledge, pedagogical knowledge and pedagogicalcontent knowledge for the school and grade they teach in. 3e) Employs a variety of instructional strategies that encourages studentparticipation and critical thinking. 								
Learning Outcome the lesson, picked developed from t course specification	e for l and he on	Learning	g Outcomes		Learning	Indicators	Identi and tr and ad addre	fy whi ansfe ddress ssed o	ich cross – cuttin rable skills, inclu sing diversity. Ho or developed	g Issues, core sivity. Equity w will these be
Learning indicator	rs for come	 Demoti understa mixtures separati Design develop appropri experimi that can teach M separati mixtures 	nstrate the anding of s and their on methods n age and mentally iate ental model be used to ixtures and ons of s at the JHS	s	 Provever and that the i envin Provever expension or de revie port 	ide a report o yday mixtures the componen form them fro mmediate ronment ide samples o erimental mod esigns for peen ew and store in folio	n Correc identi ints sharin om tempe Fahren of con respec f differe els respon n in grou	et han ficatio g idea eraturo nheit, nmuni et whil ence a nsibilit up wo	dling and uses of in of tools for me is in class, conver e from degree Ce Studentteachers ication, collabora le appreciating in nd abilities, critic ty through carefu rk/discussion.	devices, good asurements, sion of Isius to degree develop skills tion and mutual dividual cal thinking and I participation

Topic/Title	Sub Topic	Time or	Teaching and learning to achieve learning outcomes: depending on			
		Stage	delivery mode selected. Teacher led, collaborative group work or			
			independent study			
			Teacher Activity	Student Activity		
Teaching separation of	Recap of	30	Face-to-Face: Recap lesson	Face-to-Face: Student teachers respond		
mixtures	lesson on	minutes	on energy changes and link it	to questions on previous lesson and		
	Energy		to the new topic 'separation	identify links between energy changes		
	changes		of mixtures	and separation of mixtures		
	Separation	60	Face-to-Face: Tutorinitiates a	Face-to-face: Student teachers work in		
	of a named	minutes	pyramid discussion on	groups, discuss daily mixtures and how		
	mixture		everyday mixtures and how	they are formed with the help of videos		
			they are formed. Student	form online such as		
			teachers arerequired to note	https://www.youtube.com/watch?v=Je		
			the components involved in	axMKPM8Z8,		
			the everyday mixtures	https://www.youtube.com/watch?v=bk		
				YqqJa5P8w (Accessed on 22/06/2019)		
	Designing	90	Face-to-Face/e-learning:	Face-to-Face/e-learning: Student		
	Experiments	minutes	Provide examples of	teachers remain in their groups and		
	on		experimental models and	using the examples of experimental		
	Separation		videos for student teachers	models and videos, they discuss and		
	of Mixtures		to be able to design age and	design age and developmentally		
			developmentally appropriate	appropriate experiments that can be		
			experiments that can teach	their work in the last 20 minutes for		
			teacher remains in their	their peers to critique		
			groups and presents their	then peers to chuque.		
			work in the last 30 minutes			
			for their neers to critique			
			Student teachers are			
			required to produce written			
			reports for critique.			
Which cross cutting	Equity and SEN	N: through s	setting ground rules to protect v	ulnerable student-teachers and		
issues will be addressed	establishing ar	n interactiv	e and inclusive classroom atmos	phere. By practicing with readily available		
or developed and how	materials for mixtures will reduce studentteachers' difficulties in teaching separation of mixtures.					
Lesson assessments –	Assessment as Learning: Report submitted for assessment on how mixtures are formed and					
evaluation of learning:	peers critique designed experiments					
of, for and as learning	NTS 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content					
within the lesson	knowledge for the school and grade they teach in					
	NIS 36:Employs a variety of instructional strategies that encourages student participation and					
	critical thi	nking.				
Teaching and Learning	Somo rocouro	a that way	Id he required to successfully on	able on inclusive integrated science		
Posourcos	some resource	d bo Labor	to be required to successfully en	able an inclusive integrated science		
Resources		ductivity to	holy equipment, chemicals, sind	s to work better) Subject based		
	instructional to	nols/applic	ations https://www.youtube.com	m/watch?v=1770001Gp5Y		
	https://www.v	outube.co	m/watch?v=JeaxMKPM8Z8.			
	https://www.y	outube.co	m/watch?v=bkYqqJa5P8w (Acces	ssed on 22/06/2019)		
Required Text (core)	Abbey, T. K., A	lhassan, B.,	Ameyibor, K., Essiah, J. W., Fom	netu, E., & Wiredu, M.B. (2008). Ghana		
	association of	science tea	chers integrated science for seni	or high schools. Accra: Unimax		
	MacMillan; Ha	ndbook for	PD Coordinators Themes 1-10			
Additional Reading List	Abbey, T. K., &	Essiah, J.W	. (1995). Ghana association of so	cience teachers physics for senior high		
	schools. Accra	: Unimax M	acmillan.			
	Ameyibor, K.,	& Wiredu, I	M. B. (2006). Ghana association	of science teachers' chemistry for senior		
	high schools. A	Accra: Unim	ax MacMillan.			
	Asabere-Amey	/aw, A., & C	ppong, E. K. (2013). Integrated s	science for the basic school teacher I.		
	Winneba: IEDE					
	Oddoye, E. O.	K., Taale, K	. D., Ngman-Wara, E., Samlafo, V	/., & Obeng-Ofori, D. (2011). SWL		
	integrated scie	ence for ser	ior high schools: Students book.	Accra, Ghana; Sam-Woode Ltd.		
CPD Requirement	Learning to ma	ake and inte	erpret concept maps			
	Practicing to b	e familiar v	vith methods of separating mixtu	ures and using online teaching resources		
	Honesty throu	gn reportin	g actual method best for each m	nixture.		

Year of B.E	d. 2	Semeste	er 1	Place of le	sson in semes	ter 1234	4567891	0 11 12			
Title of Lesso	n	Course R	eview II wit	h STS seminar		Lessor	Duration	3 hours			
Lesson descri	ption	This less review a teaching	This lesson is a review and audit of the lessons for the second half of the semester as well as review and discussion of lessons learned, reflection on observations made during the supported reaching in schools (STS) within the second half of the semester.								
Previous stud	lent teacher	Lessons	Lessons learnt from lesson 8 through lesson 11 in all learning approaches and								
knowledge		observat	observations/experiences during STS.								
Possible barr	iers to learning	Miscond	eptionsabo	ut some conce	pts not adequate	ly dealt with. Le	ssons not app	ropriately			
in the lesson		understo	od by stude	nt - teachers.			-				
Lesson Delive	ery – chosen to	Face-	Practical	Work-	Seminars	Independent	e-learning	Practicum			
support stud	ents in	to-face	Activity	Based	V	Study	opportuniti	es			
achieving the	e outcomes	V		Learning	1	V	V				
Lesson Delive	ery – main	Face-to-	Face-to-Face: Discussion, group work in same ability group works.Modelling, Concept Mapping								
mode of deliv	ont toochors in	Indonon	ooning. doot Study: '	Tutor and stud	ont toochor roflo	ctions (individus	ally and colloc	tivolu)			
achieving the	learning	e-learnir	ueni siuuy. 19 Onnortun	ities: OFRs and	l Video presentat	ions	any and conect	lively)			
outcomes.		Seminar	Presentatio	ons. Discussion	s and reflections	of STS					
outcomeon		Serrinar				01010					
Purpose for t	he lesson, what	Asce	ertain the lev	el of understa	nding of concept	S.					
you want the	students to	• Test	various skil	s and cross – c	utting issues						
achieve, serv	es as basis for	• Prov	vide remedia	l tuition/tutor	ials where necess	ary for experier	nces during ST	S			
the learning	outcomes. An	Corr	ect misconc	eptions and m	isinformation						
expanded ve	rsion of the	• Buil	d the necess	ary support go	ing forward on S	EN and Gender	issue				
description.											
Write in	full aspects of	NTS:	NTS:								
the NTS	addressed	1a) Critic	cally and coll	ectively reflec	t to improve teac	hing and learnir	Ig				
		1c) Dem	1c) Demonstrate effective growing leadership qualities in the classroom and wider school								
		1d) Is gu	1d) Is guided by legal and ethical teacher codes of conduct in his or her development as								
		professio	protessional teachers2a) Demonstrates familiarity with the education system and key policies								
		guiding i	guiding it. 2b) Has comprehensive knowledge of the official school survively including locating subserves.								
		20) Has s	20) has comprehensive knowledge, pedagogical knowledge and pedagogical content knowledge								
		for the s	for the school and grade they teach in.								
		2e) Unde	2e) Understands how children develop and learn in diverse contexts and applies this in his or her								
		teaching	teaching								
Learning	Outcome for	Learning	Outcomes		earning Indicato	ors	Identify whic	h cross –			
the lesso	on, picked and						cutting Issue	s, core and			
develope	ed from the						transferable	skills,			
course s	pecification						inclusivity. E	quity and			
 Learning 	indicators for						addressing d	iversity. How			
each lea	rning outcome						will these be	addressed or			
		a lalara	4:6			6) A /	developed				
		• Iden	itify weakne	ss and	 Make a list of and strongth 	r Weaknesses	Communicat	ion and			
		stre	nguis in lear nce lesson f	ning the	and strength	aring	Research Th	rough group			
		nori	nce lesson 10 od under rev	/iew	Provide a rof	arms lection report	work and nr	esentation			
		Re a	ble to refler	ton	on STS and		Equity and R	eflection is			
		less	ons learnt so	o far (STS)	demonstratio	ons and	developed fr	om reflective			
		and	state new ir	sights	illustrations	on a given	activities				
		and	/or grev area	as needing	media of less	ons learnt so	Creativity an	d critical			
		rem	edies		far		, thinking are	deployed in			
		Corr	ect		 Present conc 	ept maps	developing n	nodels and			
		miso	conception/i	misinforma	and/or mode	ls linking	concept map	S			
		tion	for earlier le	esson (7–	misconceptic	ons/misinform					
		11)			ation to new	insights					

Content of lesson picked and developed from the course specification	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study			
Topic Title			Teacher Activity Facilitate and provide the necessary tool for students activities.	Student Activity		
Course Review II with STS seminar	Reviewing the understanding of lessons on Teaching Solubility, Teaching Colloids I and II, Teaching energy changes and Teaching Separation Methods	60 minutes	Face-to-face: Tutor led brainstorming session with student teachers to unearth the weaknesses and strengths of student teachers in the lessons 7 – 11. Initiate discussion /Talk for learning approach using groupings (Same ability and then mixed groups) to identify student teachers' strengths and weakness in the lessons learnt so far.	Face-to-face: Student teachers discuss their problems in the previous lessons and provide a checklist identifying and recording all possible weaknesses and strengths.		
	Remedies to course topics	30 minutes	Face-to-Face: Tutor groups student teachers according to remedy need and provide specific task assistance in the areas on concept needing remedy.	Face-to-Face: Students work in the special groups (Same remedy need group) on tasks to remedy their learning need. They then present concept maps and/or models linking misconceptions/misinfo rmation to new insights.		
	Discussion of observations during STS	90 min utes	Seminar: Tutor allows two or three resource persons to make presentations on STS based on the NTS. Tutor then guides student teachers through problem- based learning on National Teacher's Standards and reflection on observations made during STS.	Seminar:Student teachers listen to various presentations. Student teachers then discuss observations made during STS based on the National Teacher's Standards, reflect and provide a checklist of lessons learned and problems identified and how they can be addressed. Student teachers then provide a reflection report on STS		
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through Teachers and establishin Through modelling and	n mixed and sam ng an interactive group work, coll	e group work to protect vi and inclusive classroom a aboration is established.	ulnerable student tmosphere.		

Lesson assessments – evaluation of, for and as learning within the lesson	 Assessment of learning: Student teachers make presentations on how to model NTS 3a: Plans and delivers varied and challenging lessons, showing a clear grasp of theintended outcomes of their teaching. Assessment as learning: Student teachers engage each other inpeer remedial tutoring NTS 3e: Employs a variety of instructional strategies that encourages studentparticipation and critical thinking NTS 3l: Listens to learners and gives constructive feedback
Teaching &Learning Resources	Cardboards, Course manual, Poster paper, Projectors,
Required Text (core)	Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of science teachers integrated science for senior high schools. Accra: Unimax MacMillan.
Additional Reading List	 Abbey, T. K., &Essiah, J.W. (1995). Ghana association of science teachers physics for senior high schools. Accra: Unimax Macmillan. Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers chemistry for senior high schools. Accra: Unimax MacMillan. Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher <i>I</i>. Winneba: IEDE. Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V., & Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.
CPD Requirement	Training on preparation of checklist and Reflection guides

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