

Four-Year B.Ed. Course Manual

CHEMISTRY AROUND US









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

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INTRODUCTION TO COURSE MANUALS

Welcome to this B.Ed. Course manual.

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

The manuals serve the following purposes:

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

Specifically, they also:

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

Who are course manuals for:

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

USING THIS MANUAL

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

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

My teaching philosophy is

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

A. Course Information

Teaching Strategies and Assessments

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 JHS 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 instill 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 Chemistry Around Us

Pre-requisite Introduction to Basic Chemistry II

 Course Level
 400
 Course Code
 Credit Value
 3

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 JHS school level.

2. Course Description

The course for semester two of year Three uses the universal design for learning approach to extend the integrated science concepts for the JHS level and introduce specific teaching strategies and Assessment to the JHS curriculum so as to provide an enabling environment for student teachers to share their experiences for mopping up procedures. The following areas will guide the learning process:Reviewing the previous course on preparing to teach, Reviewing the basic school integrated science curriculum, implementing the basic school science curriculum, andreflective Practices. This is done through appropriate pedagogies such as Nature walk, talk for learning approaches, demonstrations, concept mapping, problembased teaching /learning, and video presentations as well as authentic assessments mode such as concept mapping, using checklist to identify values and attitudes and, mind maps which provides for the teachers' attention on the need to ensure equity and the 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, Supported Teaching in School (STS) (NTS, 2e), and managing transitions within early grade classes. (NTS, 2e, p.13), (NTS, 1a-c, p. 12), (NTS, 2c, P. 13).

3. Key Contextual Factors

Several interventions have been initiated by government to promote the teaching and learning of science in schools, as science is the gateway to industrial and technological growth. There are numerous challenges faced by secondary science education which includes the need for science equipment and also qualified science teachers who are trained to integrate ICT into 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 than 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 the upper primary through to the end of the JHS grade learning.

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
CLO1. explain the types of chemical bonding and how they define the characteristics of chemical substances. (NTS p.13;2b)	• Provide worksheets on types of chemical bonding and its definition on the characteristics of chemical substances.
CLO2. demonstrate understanding of the importance of pH in daily activities such as farming, food processing and water treatment. (NTS p.13;2b)	 Prepare Photograph/Report/video to show a visit to a farm, food processing company and water treatment plant Provide exercises in student teachers' workbook on the use of pH in classifying solutions and discuss their importance in farming, food processing and water treatment

CLO3. demonstrate ac electrolytes an their applicatio	dequate knowledge on id non-electrolytes and ons (NTS p.14, 3i), (NTS p.	the importance of P discuss buffers and b 13, 2b) D cl	resent group report on the chemical and iological importance of electrolytes from non- lectrolytes esign chart showing applications of buffer in nemical systems and in everyday life
CLO4. Recognize the us describe our c on food proc importance of production. (N	ses and economic impor limate (tropical wet and luction as well as exp nitrogen and phospho TS 1a, 1b & 1e, p12; 2b, p	tance of water and C d dry) and its effect p blain the chemical in brus cycles in food P b13; 3a & 3i, Pg.14) effective	ollect samples of multimedia/PowerPoint resentation on the use and the economic nportance of water rovide a short write-up on the climate and its ffect on food production
CLO5. Further studies on co- planning, co-to	secondary school chemi eaching and co-assessme	istry curriculum and P ent P te	repare Lesson notes that caters for special eeds, equity, inclusivity and is conceptual-based resent report on peer- review of co- planning, co- eaching and co-assessment by student teachers
7. Course Content	Tania	Cubtonia (if anu)	Taashing and laguning asticity to ashic
Unit (week)	ιορις	Subtopic (if any)	the learning outcomes
Week 1	Recap of the course Introduction to Basic Chemistry Iland Introduction to Chemistry Around Us Manual	 Recap of Introductio to Basic Chemistry Illessons and challenges thereof. Introducing Year 4semester 2 CM. 	 Demonstrations and discussions of Introduction to Basic Chemistry II CM Reflections, presentations and designing Maps on challenges and unique nature of Y4 semester 2 CM
Week 2	Chemical bonding in substances	 Physical properties of compounds Chemical properties compounds 	 Discussion on the how the bonds in a substance define its physical properties such as solubility in water Video presentation on the formation of covalent and ionic bonds
Week 3	Hydrogen ion concentration (pH) in systems	 Importance of pH in the food industry/preservatio 	 Showerthoughts discussion and videos presentations of PH in substances and foods Simulation and multimedia presentations on importance of PH in food preservations.
Week 4	Hydrogen ion concentration (pH) in systems	 Concept of buffer Buffers and their applications 	 Videos presentations and discussions of Buffers and the application of buffers Reflection on practicing professional attitudes and skills. Demonstrate some buffer applications
Week 5	Electrolytes and non- electrolytes	 Conceptual meaning of electrolytes and non- electrolytes Importance of electrolytes and non- electrolytes 	 Pyramid discussions are used to explain the concepts of electrolytes and non-electrolytes. Simulations and brainstorming activities on the importance of electrolytes
Week 6	Course Review with STS seminar	 Reviewing and reflecting on all lesson STS Seminar on post Internship 	 Face-to-face: Discussion, talk for learning approaches with student teacher presentations on lessons learnt from week 1 to week 5 Independent Study: problem-based learning on National Teacher's Standards and reflection on what has been observed and done during STS.

Week 7	Water	 Aqua chemistry Purification Water Uses of water and economic Importance 	 PowerPoint Presentation and Discussion of Water, its Structure and its purification Seminar/field trip to water treatment plant
Week 8	Climate	 Types of climate (Wet tropical, Tropical monsoon, Tropical wet and dry) 	 Discussions and Group presentations on climate and climate types Reflections on Climate Changes
Week 9	Food Production	 Relationship between chemicals and food production (Nitrogen, potassium and phosphorus 	 OER/video presentations on climate change and its effects on food production Field trip interactions to the farms/markets to find the effect of climate on food production Discussion on the importance of nitrogen, potassium and phosphorus in food production.
Week 10	Further studies on the Secondary School Chemistry Curriculum	 Prepare 30-minute lessons that demonstrate content and pedagogical issues enshrined in the curriculum Identify students who struggle to overcome barriers In collaboration with co- teacher and mentor, write individualized plans of action, including differentiated instruction/assessment 	 Talk for learning approaches on how to prepare a typical lesson plan that caters for special needs, equity, inclusivity and is conceptual-based Video/ multimedia simulation on a typical chemistry lesson that is inclusive. Group presentation and reflections of well-prepared lesson plans and differentiated instruction/ assessment tools.
Week 11	Co- planning, co-teaching and co-assessment	 Plan for and teach sequences of lessons with regard issues of equity and inclusivity. valuate and reflect on teaching and on pupils' learning to support students 	 Small group discussions on co- planning, co-teaching and co- assessment Diagnostic assessment tools by student teachers mixed ability/gender based group. Seminar presentations on co- planning, co-teaching and co- assessment in mixed ability/gender based group. Role play/student practice of teaching strategies to teaching and assessment
Week 12	Course Review II with STS seminar	 Reviewing and reflecting on lessons 7- 11 and Post STS Seminar 	 Face-to-face: Discussion, talk for learning approaches with student teacher presentations on lessons learnt from week 7 – week 11 Independent Study: problem-based learning on National Teacher's Standards and reflection on Post STS
Teaching and Learning Strate Group Discussions, I presentations, simu learning approaches demonstrations.	egies: Role Play activities, lations and Comput s, showerthought, p	Multimedia presentations, Inde er assisted instructions, field tri practical demonstrations, proble	pendent Study, face-to-face, video ps and seminar presentations, talk for m solving tutorials, interactive
Course Assessment Compon	ents:		

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) Component 1: Summary of Assessment Method: End of Semester Examination on key concepts as shown in the lessons. Core skills to be acquired: Cognitive, literacy, numeracy, writing and reading Weighting: 40% CLO1 to CLO6 NTS 1 **Professional Development** The Teacher(s): a) Critically and collectively reflects to improve teaching and learning. b) Improves personal and professional development through lifelong learning and Continuous Professional Development. **Community of Practice** The Teacher: d) Is guided by legal and ethical teacher codes of conduct in his or her development as a professional teacher. 2 Knowledge of educational frameworks and curriculum The Teacher: a) Demonstrates familiarity with the education system and key policies guiding it. b) Has comprehensive knowledge of the official school curriculum, including learning outcomes. c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. Managing the learning environment The Teacher: a) Plans and delivers varied and challenging lessons, showing a clear grasp of the intended outcomes of their teaching. 3 Managing the learning environment The Teacher: a) Plans and delivers varied and challenging lessons, showing a clear grasp of the intended outcomes of their teaching. Assessment The Teacher: k) Integrates a variety of assessment modes into teaching to support learning. 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 2:** Assessment for Learning Presentations/Portfolio Summary of Assessment Method: Peer Review / Tutor assessment of portfolio of materials and resources amassed duringthe course: In the final session of the course student teachers present the teaching and learning portfolios they have developed during the course for peer review and then tutor assessment. The final portfolio should include: all the items added throughout the course: presentations, TLMs, example plans for lessons and an up-dated personal teaching philosophy for teaching earlygrade science, a list of key lessons learned during the course and three targets for developing their skills, knowledge and understanding of teaching and learning further Weighting: 30 % CLO 1, CLO 4, CLO5 and CLO6 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 trinking.
3) Explains concepts clearly using examples familiar to students.
s) Produces and uses a variety of teaching and learning resources including ici, to
Component 3: End of Semester Examination – (40% overall Semester Assessment
Component 3: Assessment as Learning Review of Reports/Portfolio
Summary of Assessment Method: Peer Review documents/ Evidence of report from school (STS) visits for
portfolio/Reflective notes and as prescribed by University of Affiliation
Core skills to be acquired: Pedagogical, observational and cooperative skills
Weighting: 30%
Write a 1500-word report on what strategies need to be used in science teaching to ensure all learners are included and that
the teaching is appropriate to the typical characteristics of the upper primary learner. Include reference: to examples of
teaching you have observed and taken part in in school; topics covered during the course and The Basic School Science
Curriculum
CLO1, CLO4, CLO5 and CLO6
NTS:
1a) Critically and collectively reflects to improve teaching and learning
2c) Has secure content knowledge, pedagogical knowledge and pedagogical
content knowledge for the school and grade they teach in.
Sin) identifies and remediates learners difficulties of misconceptions, referring
Required Reading and Reference List
Abbey T K Albassan M B Ameribor K Essiah I 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.
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.
Teaching and Learning resources
Smartphones, Tablets, Productivity tools (software that allow teachers to work better), Subject based instructional
tools/applications, Instructional laboratories, Smart boards, projectors, Smart screens, Open ERs – YouTube, Coursera, Khan
Academy, TESSA and UNESCO OERs, iBox, and standard laboratories
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.	4	Semester	2	Place	e of lesson in s	semester	1234	5678	9 10 11 12		
Title of Lesson	Recap of Chemist	Recap of the course Introduction to Basic Chemistry II and Introduction to Chemistry Around Us ManualLesson Duration3 Hours									
Lesson description	The less chemistr lesson is environr	The lesson is intended to review and embed principles and concepts acquired in the course basic chemistry II and how these can be used to develop concepts in the chemistry around us. Further, the lesson is designed to embed concepts in chemistry that are often used on a daily basis in the environment.									
Previous student teacher knowledge,	Student	Student teachers have been introduced to the course on Basic Chemistry II.									
prior learning (assumed)											
Possible barriers to learning in the lesson	Possible •	misconceptic Dogma of the	ons tha e com	at student position o	teachers may f compounds i	bring to the class n the home and e	room: environme	ent.			
Lesson Delivery – chosen to support students in achieving the outcomes	Face-t face	o- Practio V Activi	cal ty	Work- Based Learning	Seminarsv	Independent Study √	e-learni opportu N	ng unities /	Practicum		
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to Seminar Indepen e-learnii	Face-to face: Discussions, demonstrations and observations, rhyming and singing Seminars:Presentations and discussions Independent Study: Reflections e-learning Opportunities: Simulations, video presentations									
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. • Write in full aspects of the NTS addressed	 Dev Disc (NTS) 2c: Has s content 2e: Under this in hi 3d: Man 	 Develop appropriate knowledge in some chemical compounds in the environment. Discard the preconceived notion some compounds in the environment. (NTS) 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 2e: Understands how early adolescent learner learns in diverse contexts and applies this in his or her teaching. 3d: Manages behaviour and learning with small and large classes) 									
 Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning	g Outcomes			Learning Ind	icators		Identify cutting transfer inclusiv address How wi address	which cross- issues, core and rable skills, ity. Equity and ing diversity. Il these be sed or developed		
	Demo trans from new o	onstrate the fer knowled one lesson or concepts (NTS	e ab ge ar nto de S 2e &	ility to nd skills veloping 2f, p.13	 Present expectat betweer chemistr 	a checklist on nev tions based on the n Basic chemistry ry around us.	v e links II and	Through sharing student develop commu collabo	of ideas in class teachers the skills of nication, ration and		

Tonic/Title	Sub Tonic	Time or	Teaching and learning to achieve	mutual respect while appreciating individual difference and abilities. They also acquire skills in handling devices, develop critical thinking, honesty, accuracy and responsibility through active participation in group work/discussion.			
Topic/ Inte		Stage	depending on delivery mode sel	ected. Teacher led, ependent study			
			Teacher Activity	Student Activity			
Recap of the course Introduction to Basic Chemistry II and Introduction to Chemistry Around Us Manual	Recap of lessons from Basic Chemistry II	60 minutes	Face-to-face: Tutor reviews lessons on Basic Chemistry II with student teachers and leads student teachers to discuss their expectations of Year 4 Semester 2 Course on Chemistry Around Us	Face-to-face: Students teachers discuss lessons on Basic Chemistry Iland come out with key concepts from the previous semester lessons.			
	Introducing New CM (Chemistry Around Us)	60 minutes	Face-to-face: Teacher initiates a discussion to introduce the new course Manual (CM)to student teachers in whole group.	Face-to-face: Student teachers discuss with tutor on their expectations for the new CM (while skimming through new CM) and the links or similarities with the previous lesson on Basic School Chemistry.			
	Reflections on Expectations for the CM	60 minutes	Face-to-face/Group activity: Tutor groups student teachers into mixed ability to discuss and reflect on the new CM	Face-to-face: Student teachers in mixed ability group discuss among themselves and later share their reflections with tutor on the expectations of the new CM.			
Which cross cutting issues will be addressed or developed and how	Equity and SEN: throu student teachers, esta	gh appropriate g blish an interact	ender and equity sensitive group v ive and inclusive classroom atmos	vork to protect vulnerable bhere.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	 Assessment as learn Assessment for learn new CM. 	ning: student tea rning: student te	achers provide list of key concepts eachers in groups provides a reflect	in previous lesson. ive report on expectations for			
Teaching Learning	Course manual for bas	sic chemistry II a	nd Course Manual for Year 4 seme	ster 2			
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 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. 						
	science for senior high	schools: Studen	<i>ts book</i> . Accra, Ghana; Sam-Woode	e Ltd.			
CPD Requirement	CoE Tutors need traini	ing on arranging	and composing rhymes and songs	as well as game construction			

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)						

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

LESSON 2 Year of B.Ed. 4 Semester 2 1 2 3 4 5 6 7 8 9 10 11 12 Place of lesson in semester Title of Lesson Chemical bonding in substances Lesson Duration 3 Hours Lesson description The lesson is designed to make student teachers reflect substances in the home and environment and how they are formed (bonding) as well explain their characteristics using the knowledge of how they are formed. The topical issues discussed in this lesson are physical and chemical properties of Compounds and how these can be made practical in class for the JHS learner. **Previous student** Recap of basic chemistry II and introduction of Chemistry around us. teacher knowledge, prior learning (assumed) Possible barriers to Student-teachers may: learning in the lesson Have memorized concepts of technical repeated scientific expla nation of compounds and mixtures from the SHS. Lesson Delivery -Face-Practical Work-**Seminarsv** Independent e-learning Practicum to-face Activity Based **Study**√ opportunities chosen to support students in achieving v Learning v the outcomes Lesson Delivery -Face-to face: Discussions, demonstrations and observations main mode of delivery Seminars: Group presentations of reflective reports and discussions chosen to support Independent study: Reflective report writing student teachers in e-learning Opportunities: Simulations, video presentations achieving the learning outcomes. Purpose for the Appreciate that teaching is basically facilitation and learning is an active process. • lesson, what you want Demonstrate the skill and knowledge in identifying and developing appropriate teaching strategies the students to NTS achieve, serves as 1a) Critically and collectively reflects to improve teaching and learning. basis for the learning 1c) Demonstrates effective growing leadership qualities in the classroom and wider school. Community of outcomes. An Practice expanded version of 2c: Has secure content knowledge, pedagogical knowledge and pedagogical the description. content knowledge for the school and grade they teach in. Write in full 2e: Understands how children develop and learn in diverse contexts and applies • aspects of the this in his or her teaching. NTS addressed 3a) Plans and delivers varied and challenging lessons, showing a clear grasp of the intended outcomes of their teaching. 3b) Carries out small-scale action research to improve practice. 3d: Manages behaviour and learning with small and large classes Learning Outcomes Learning Indicators Identify which cross- cutting Learning • issues, core and transferable Outcome for the skills, inclusivity. Equity and lesson, picked and developed addressing diversity. How will these be addressed or developed

from the course specification • Learning indicators for each learning outcome	 Demonstrate knowledge of the physical and Chemical properties of compound(NTS 2c, p.13) Demonstrate the skill to explain these properties to JHS learners 	 Produce charts and showing Physical an properties of compo Present Video/multi explain the concepts learner 	drawings d chemical bunds imedia to s to the JHS	Through group discussions and sharing of ideas in class student teachers develop the skills of communication, collaboration and mutual respect while appreciating individual difference and abilities. They also acquire skills in handling devices, develop critical thinking, honesty, accuracy and responsibility through active participation in group work/discussion.		
Topic/Title	Sub Topic	Time or Stage	Teaching and outcomes: de selected. Teac or independer Teacher Activi	learning t pending o her led, c nt study	o achieve learning n delivery mode ollaborative group work	
Chemical bonding in substances	Physical Properties of Compounds	30 minutes	Face-to-face/e- learning: Tutor uses video and other internet to initiate lesson and allows student teachers to form groups of 3 members in mixed ability to discuss the lessons on chemical substances and their physical appearance using lessons learnt from lesson 1		Face-to-face/e- learning: Student teachers form groups of 3 members in mixed ability to view videos or other internet resources and discuss the lessons on chemical substances and their physical appearance using lessons learnt from lesson 1	
	Chemical Properties	60 minutes	Face-to-face/e Learning: Tuto video and inte resources to g student teache their groups to chemical subs and their chen composition.	e- or uses rnet uide ers in o discuss tance nical	Face-to-face/e- learning:Student teachers view videos from internet resources on the chemical composition of chemical substances and discuss with tutor.	
	Reflections on Chemical Bonding	60 minutes	Seminar: Tutor guides s teachers to re- the Physical ar Chemical Prop and how bond results in these properties usin videos and oth internet resou	tudent- flect on nd erties ing e ng ner rces.	Face-to-face: Student teachersreflect on the Physical and Chemical Properties and how bonding results in these properties using videos and other internet resources. Student teachers cross share their reflections	
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through approp teachers, establish an interactive	riate gender and equity e and inclusive classroor	sensitive group n atmosphere.	work to p	rotect vulnerable student	

 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

Lesson assessments -	Assessment as learning: student teachers' cross share their reflections
	• Assessment as learning, student teachers cross share their renections.
evaluation of	
learning: of, for and as	
learning within the	
lesson	
Teaching Learning	Cardboards, poster papers, https://www.youtube.com/watch?v=KjoQHqgzda8 ,
Resources	https://www.youtube.com/watch?v=VSc491HLzDo, https://opentextbc.ca/chemistry/chapter/physical-
	and-chemical-properties/
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	Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers physics for senior high schools.
List	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 student teachers on how to teach thermal energy

Year of B.Ed.	4	Sem	nester	2 PI	ace of lesson in semester	12	1 2 3 4 5 6 7 8 9 10 11 12			
Title of Lesson	Hydro	Hydrogen ion Concentration (pH) in SystemsLesson Duration3Hot								
Lesson description	The le and A learne	The lesson is designed to further improve student teachers conceptual understanding of chemicals (Acids and Alkalis or bases) and to guide student teachers to be able to present this in practical ways for the JHS learner.								
Previous student teacher knowledge, prior learning (assumed) Possible barriers to learning in the	Stude Stude	Student teachers havegone through a course in Acids and basis and lesson 2 Student teachers may: Misconseptions about the sources of acids in the environment								
lesson Lesson Delivery – chosen to support students in achieving the outcomes Lesson Delivery –	Face-1	e-to- ce √ to face:	Practical Activity Discussions,	Work- Based Learning demonstra	SeminarsV tions	Independent Study	e-learning opportunities √	Practicum		
main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Semin e-lear	Seminar:presentations from reflections e-learning Opportunities: Simulations, video presentations								
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. • Write in full aspects of the NTS addressed	• D NTS 1 1 0 2 50 2 50 2 16 3 0 3 3	 Demonstrate the knowledge and understanding in pH in systems NTS 1a) Critically and collectively reflects to improve teaching and learning. 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. Community of Practice 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 2e: Understands how children develop and learn in diverse contexts and applies this in his or her teaching. 3a: Plans and delivers varied and challenging lessons, showing a clear grasp of the intended outcomes of their teaching. 3b: Carries out small-scale action research to improve practice. 3d: Manages behaviour and learning with small and large classes 								
 Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learn	ing Outo	comes		Learning Indicators		Identify which co cutting issues, co transferable skil inclusivity. Equit addressing diver will these be add developed	ross- ore and ls, y and sity. How dressed or		

	 Demonstrate knowledge skills in identifying pl systems (NTS 2c, p.13) Demonstrate the ability explain the concepts of p JHS learners. 	and Present H in system • Demon concep pH to	t concept maps on pH in s in the home astrate how to explain the asts to their peers	Through group discussions and sharing of ideas in class student teachers develop the skills of communication, collaboration and mutual respect while appreciating individual difference and abilities. They also acquire skills in handling devices, develop critical thinking, honesty, accuracy and responsibility through active participation in group work/discussion.
Topic/Title	Sub Topic	Time or Stage	Teaching and learning to a depending on delivery mod	chieve learning outcomes: le selected. Teacher led,
			collaborative group work o	r independent study
			Teacher Activity	Student Activity
Hydrogen ion	Introduction to the concepts	40 minutes	Face-to-face/e-learning:	Face-to-face: Student
in Systems	concentration in systems		videos/internet resources	withTutor to recap lesson
,			discusses with student	on acids and alkalis/bases
			teachers to recap lesson	and introduce the
			on acids and alkalis/bases	concepts of pH
			concepts of pH.	
	Importance of pH in the food	60 minutes	Independent Study: Tutor	Independent Study:
	Industry		Presents a checklist on some pH systems in the	Student teachers collect
			immediate school	systems in the immediate
			environment to student	school environment and
			in mixed ability groups to	form themselves into mixed ability groups to
			walk round the	walk round the
			school/college premises to	school/college premises to
			identify and fill out the	identify and fill out the
			later in the classroom	later in the classroom
		80 mins	Face-to-Face/Seminar:	Face-to-Face/Seminar:
			Tutor guides student	Student teachers, in their
			teachers in their groups to	groups return to the class,
			the nature walk and cross	Tutor discuss their findings
			share.	and cross share.
Which cross cutting	Equity and SEN: through settin	g ground rules to	protect vulnerable student-tea	achers and establishing an
issues will be addressed or	Interactive and inclusive classro	oom atmosphere	and encourage collaboration a ions and practical activities	ind mutual respect.
developed and how		ign experimentati	ions and practical activities.	
Lesson assessments	Assessment as learning: stu	Ident teachers Cro	oss share their checklist conten	t.
- evaluation of				
as learning within				
the lesson				
Teaching Learning	Simulations and multimedia, p	osters, projectors	, https://sciencing.com/can-af	fected-change-ph-levels-
nesources	https://www.voutube.com/wa	atch?v=d8f85k3I w	/wA. https://www.voutube.com	n/watch?v=9X5DTFYgtsO
	https://www.youtube.com/wa	atch?v=v9-9MfJM	tyg	<u>.,</u>

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	Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers physics for senior high schools.
List	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: IFDF.
	Oddove, 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 student teachers on how to teach thermal energy
Course Assessment	³ 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)
	⁴ 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

 ³ See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP
 ⁴ See rubrics on Subject Project Assessment in Annex 6 of NTEAP

Year of B.Ed.	4	S	emester	2	Place of lesson in	semester		123 4 56789		9 10 11 12	
Title of Lesson	H	Hydrogen ion Concentration (pH) in Systems Lesson 3 Duration							3 Hou	rs	
Lesson descriptior	i Th (A fo	The lesson is designed to further improve student teachers conceptual understanding of chemicals Acids and Alkalis or bases) and to guide student teachers to be able to present this in practical ways for the IHS learner- a continuation from lesson 3									
Previous student teacher knowledg prior learning (assumed)	e,	From Lesson 3									
Possible barriers t learning in the les	o St son	Student teachers may: Student teachers may: • Misconceptions about the sources of acids and bases in the environment. Misconceptions about the sources of acids and bases in the environment									
Lesson Delivery – chosen to support students in achiev the outcomes	ing fa	ace- to- ice V	Practical Activity	Work- Based Learning	Seminarsv	Independe Study √	nt	e-learni opportun √	ing ities	Practicum	
Lesson Delivery – main mode of delivery chosen to support student teachers in achiev the learning outcomes.	Fa Se In e-	ice-to emina depei learni	face: Discus rs: Group pr ndent Study ing Opportu	sions, demo esentations :Reflection a nities: Simu	onstrations and o of reports and di and cross sharing lations, video pre	bservations scussions sentations					
Purpose for the lesson, what you want the students achieve, serves as basis for the learn outcomes. An expanded version the description. • Write in full aspects of the NTS addressed	to N ing of	Der TS 1a) 1c: Cor 2c: for 2e: her 3a: out 3b: 3d:	Critically an Demonstrate munity of I Has secure of the school a Understand teaching. Plans and d comes of th Carries out Manages be	ne knowledg d collective es effective Practice content kno nd grade th s how child elivers varie eir teaching small-scale ehaviour an	ge and understand ly reflects to impr growing leadersh weledge, pedagog ley teach in. ren develop and l red and challenging d and research to d learning with sr	ding in Buffer ove teaching nip qualities ir ical knowledg earn in divers g lessons, sho o improve pra nall and large	s in sys and le the cl ge and se cont wing a actice. classe	stems arning. lassroom a pedagogic rexts and a clear gras s	and wid al cont pplies t p of the	er school. ent knowledge his in his or eintended	

•	Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome	Learning Outcomes		Learnii	ng Indicators	Identify which cross- cutting issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed		
		 Demonstrate knowledge and skills in identifying buffers in systems (NTS 2c, p.13) Demonstrate the ability to explain the concepts of pH to JHS learners 		 Prepare a checklist of buffers Demonstrate an understanding of buffers by explaining to peers 		sharing of ideas in class student teachers develop the skills of communication, collaboration and mutual respect while appreciating individual difference and abilities. They also acquire skills in handling devices, develop critical thinking, honesty, accuracy and responsibility through active participation in group work/discussion.		
Тор	ic/Title	Sub Topic	Time	or	Teaching and learning t	o achie	ve learning outcomes:	
			Stage	2	depending on delivery r	node selected. Teacher led,		
					Teacher Activity		Student Activity	
Furt	ther review of the grated science riculum	Recap of lesson 3 of pH in systemsand introducing buffers Buffers and their Applications	60 minutes rs 60 minutes 60 minutes 60 minutes 60 minutes d 60 minutes		Face-to-face: Tutor allows student teachers in whole group revise the key concepts lesson 3. Using the outcome of the responses, introduce the concept of buffers – acid base balance. Face-to-face/e-Learning Using simulations and multimedia presentation Tutor guide student teact to observe and discuss buffers in biological syst food, blood etc	to from e d - ;: chers em –	Face-to-face: student teachers in whole group revise the key concepts from lesson 3. Student teachers respond to the discussions on the concept of buffers Face-to-face: student teachers to observe and discuss buffers in biological systems	
		Reflecting on buffer systems and Application			 Independent Study: Tuto Allows student teachers forminclusive, multi-grad and developmentally appropriate groups to re and develop an appropri checklist that they will cr share on the applications buffers Face-to-face/Seminar: Tu allows student teachers form groups of mixed abilities of 3 members to plan and demonstrate th explanation of buffers to 		Independent Study: student teachers forminclusive, multi- grade, and developmentally appropriate groups to reflect and develop an appropriate checklist that they will cross share on the applications of buffers Face-to-face/Seminar: Student teachers to form groups of mixed abilities of 3 members to plan and demonstrate the explanation of buffers to JHS learners	

Which cross cutting	Equity and SEN: through appropriate gender and equity sensitive group work to protect vulnerable
issues will be	student teachers, establish an interactive and inclusive classroom atmosphere.
addressed or	
developed and how	
Lesson assessments	Assessment as learning: student teachersMake checklist of buffers in systems
 – evaluation of 	
learning: of, for and	
as learning within	
the lesson	
Teaching Learning	Simulations and multimedia, posters, projectors, https://sciencing.com/can-affected-change-ph-
Resources	levels-6165622.html, https://www.youtube.com/watch?v=id1yK29TTcc ,
	https://www.youtube.com/watch?v=d8f85k3LwwA,
	https://www.youtube.com/watch?v=9X5DTFYgtsQ, https://www.youtube.com/watch?v=v9-
	9MfJMtyg
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	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 student teachers on how to teach Optics
Course Assessment	⁵ 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)
	⁶ Component 2: Subject Project (30% overall Semester score)
	Introduction: a clear statement of aim and nurnose of the project -10%
	 Methodology What the student teacher has done and why to achieve the numero of the
	 Methodology, what the student teacher has done and why to achieve the purpose of the project – 20%
	$= \frac{1}{20\%}$
	= Conclusion = 20%
	Component 2: End of Semaster Examination - (10% overall Semaster Assessment

 ⁵ See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP
 ⁶ See rubrics on Subject Project Assessment in Annex 6 of NTEAP

Year of B.Ed.	4	Semester	2	Place of lesson in semes			ter 1 2 3 4 5 6 7 8 9 10 11 12			
Title of Lesson		Electrolytes an	Electrolytes and non-electrolytes						3 Hours	
Lesson descriptio	n	The lesson is designed to further improve student teachers knowledge and under electrolytes and non-electrolytes and to guide them to be able to teach same co IHS learner						ge and under ach same con	standing on cepts for the	
Previous student teacher knowled prior learning (as	ge, sumed)	Student teachers learnt about pH in systems from lesson 3								
Possible barriers learning in the le	to sson	Student teache	ers may	y have alte	rnative explan	ation	s for electro	olytes		
Lesson Delivery – chosen to suppor students in achie the outcomes	- rt ving	Face- Pract to- Activ face √	ical 'ity	Work- Based Learning	Seminars√	Ind Stu	ependent dy √	e-le opp	arning oortunities √	Practicum
Lesson Delivery – mode of delivery to support stude teachers in achie	- main chosen nt ving	Face-to face: D Seminars: Gro Independent S e-learning Opp)iscussi up pres tudy:R oortuni	ions, demo sentationsa Reflection ities: Simul	nstrations and and discussion ations, video p	l obse s orese	ervations ntations	<u> </u>		1
 the learning outcome Purpose for the learning outcome serves as basis for learning outcome expanded version Write in full of the NTS addressed Learning Out for the lesson picked and developed fractorise specifies Learning indifiered for each learning indifiered for each learning indifiered by the serves outcome 	omes. esson, ne eve, or the es. An n of the aspects aspects come n, om the fication icators ning	Seminars. Group presentations discussions Independent Study:Reflection e-learning Opportunities: Simulations, video presentations • Identify learners with learning difficulty and collaborating with other experts to help learners overcome learning anxieties NTS 1a) Critically and collectively reflects to improve teaching and learning. 1c: Demonstrates effective growing leadership qualities in the classroom and wider school Community of Practice 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 2e: Understands how children develop and learn in diverse contexts and applies this in his her teaching. 3a: Plans and delivers varied and challenging lessons, showing a clear grasp of theintended outcomes of their teaching. 3b: Carries out small-scale action research to improve practice. 3d: Manages behaviour and learning with small and large classes Learning Identify which cross- cutting issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these teaching.							to help I wider school. content lies this in his or of theintended issues, core sivity. Equity w will these be	
		 Explain the for electro and electrolytes (NTS 2c, p 3i, 3i, p.14) 	use lytes non 13,	 Prepare experim show th use of e non electron 	model lental set-up t le demonstrat lectrolytes and ctrolytes	ion d	Through g ideas in cla skills of co mutual rea difference skills in ha thinking, h responsibi group wor	roup of ass stu ommul spect and a nonest ility th rk/disc	discussions an udent teache nication, colla while appreci abilities. They g devices, dev ty, accuracy a prough active cussion.	nd sharing of rs develop the aboration and iating individual ralso acquire relop critical nd participation in

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			
Electrolytes and Non electrolytes	Recap of previous lesson 3 and Introductio n to the conceptual meaning of Electrolytes and Non electrolytes	60 minutes	Face-to-face/e-learning: Tutor allows student teachers in whole group to revise the key concepts from lesson 3. Using the outcome of the responses, introduce the concept of Electrolytes and non electrolytes. https://www.youtube.com/watch?v= 2U2DBWWo6nc	Face-to-face/e-learning: student teachers in whole group to revise the key concepts from lesson 3. Discuss the concept of Electrolytes and non electrolytes.			
	Importance of Electrolytes and Non electrolytes	70 minutes	 Face-to-face/e-Learning: Forming groups with 3 members with different abilities and strengths Tutor guides student teachers to: Brainstorm the importance of electrolytes and non electrolytes Creating a checklist of the uses of electrolytes and non electrolytes for cross sharing 	 Face-to-face/e-Learning: Forming groups with 3 members with different abilities and strengths student teachers: Brainstorm the importance of electrolytes and non electrolytes Creating a checklist of the uses of electrolytes and non electrolytes for cross sharingand peer review 			
	Reflecting on teaching Electrolyte and non electrolytes to JHS learners	50 minutes	Seminar/E-learning opportunities: Tutor allows student teachers maintain their groups of mixed abilities of 3 members to do peer teaching/ micro teachingto demonstrate explanations of the concepts to JHS learner	Seminar/E-learning opportunities: student teachers maintain their groups of mixed abilities of 3 members to do peer teaching/ micro teachingto demonstrate explanations of the concepts to JHS learner			
Which cross cutting issues will be addressed	Equity and SE vulnerable st	N: through an udent teacher	opropriate gender and equity sensitive gr rs, establish an interactive and inclusive c	oup work to protect classroom atmosphere.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Assessment	t as learning:	student teachers create checklist for per	review			
Teaching Learning Resources	Simulations a https://www. Z9ZYt7k	nd multimedi .youtube.com	a, posters, projectors, some fruit juice. /watch?v=2U2DBWWo6nc,https://www	.youtube.com/watch?v=hxNo			
Required Text (core)	Abbey, T. K., <i>A</i> association oj MacMillan; H	Alhassan, B., A f science teact andbook for F	Ameyibor, K., Essiah, J. W., Fometu, E., & hers integrated science for senior high sc PD Coordinators Themes 1 – 10.	Wiredu, M.B. (2008). <i>Ghana</i> <i>hools</i> . Accra: Unimax			
Additional Reading List	Abbey, T. K., a schools. Accra Ameyibor, K., high schools. Asabere-Ame Winneba: IED Oddoye, E. O. integrated sci	&Essiah, J.W. a: Unimax Ma &Wiredu, M. Accra: Unima yaw, A., &Op E. . K., Taale, K. I <i>ience for senic</i>	(1995). Ghana association of science tea cmillan. . B. (2006). Ghana association of science x MacMillan. pong, E. K. (2013). Integrated science for D., Ngman-Wara, E., Samlafo, V., &Obeng or high schools: Students book. Accra. Gh	chers physics for senior high teachers: chemistry for senior the basic school teacher I. g-Ofori, D. (2011). SWL ana; Sam-Woode Ltd.			

CPD Requirement	CoE Tutors need training in collaboration
Course Assessment	 ⁷Component 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) ⁸Component 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

 ⁷ See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP
 ⁸ See rubrics on Subject Project Assessment in Annex 6 of NTEAP

Year of B.Ed.	4	Semester	2	Place of les	son in semeste	r 123	1 2 3 4 5 6 7 8 9 10 11 1					
Title of Lesson		Course Re	Course Review I with STS seminar Lesson 3 he Duration									
Lesson descript	ion	This lesso review an teaching i	This lesson is a review and audit of the lessons for the first half of the semester as well as review and discussion of lessons learned, reflection on observations made during the supported teaching in schools (STS)									
Previous studer	nt teacher	Lessons le	earnt from	lesson 1 throug	gh lesson 5 in a	II learning approa	aches and					
knowledge, prid (assumed)	or learning	observatio	observations/experiences during STS.									
Possible barrier	s to learni	ng Lack of ur	Lack of understanding and possible misconception to some concepts not adequately dealt with.									
in the lesson		Lessons n	Lessons not appropriately understood by student teachers.									
Lesson Delivery	– chosen t	to Face-	Practica	Work-	Seminars	Independent	e-learning	Practicum				
support studen	ts in	to-face	I • • • •	Based	v	Study	opportunitie					
achieving the o	utcomes	V	Activity	Learning		v	S V					
Lesson Delivery mode of deliver support studen achieving the le outcomes.	– main ry chosen t t teachers earning	Face-to-Face-t	Face-to-Face: Discussion, group work in same ability group works. Seminar:Presentations and peer review. Independent Study: Tutor and student teacher reflections (individually and collectively) e-learning Opportunities: OERs and Video presentations									
Purpose for	r the lesso	n, • Ascer	rtain the lev	vel of understa	nding of conce	pts.						
what you w	ant the	• Test v	various skil	ls and cross – c	utting issues							
students to	achieve,	Provi	de remedia	al tuition/tutor	als where nece	essary for experie	ences during STS					
serves as ba	asis for the	e Corre	ect misconc	eptions and m	isinformation							
learning ou	tcomes. A	n e Build	the necess	ary support go	ing forward on	SEN and gender	issues					
description												
Write in ful	- l aspects o	of NTS										
the NTS ad	dressed	1a) Critica	ally and col	lectively reflect	s to improve te	eaching and learn	ning.					
		1c) Demo	nstrates ef	fective growing	g leadership qu	alities in the class	sroom and wider	school.				
		Communi	Community of Practice									
		2c: Has se	ecure conte	nt knowledge,	pedagogical kr	owledge and peo	dagogical					
		content k	nowledge f	or the school a	ind grade they	teach in.						
		2e: Under	rstands how	v children deve	elop and learn i	n diverse context	ts and applies					
		this in his	or her tead	ching.			C . 1					
		3a) Plans	and deliver	s varied and ch	nallenging lesso	ons, showing a cle	ear grasp of the					
		Intended 3b) Carrie	outcomes (u their teachin	IB. Search to imp	ove practice						
		3d: Mana	ges behavi	our and learnin	ig with small ar	id large classes)						
Learning Out	utcome for	Learning	Outcomes	Learning I	ndicators		Identify which	cross –				
the lesson,	picked and	3					cutting Issues,	, core and				
developed	from the						transferable s	kills,				
course spec	dicotors f-	-					addressing div	uity and				
 Learning Incorport 	ng outcom	0					will these he a	addressed or				
eachileanni							developed					
		 Identify 	/	Make	a list of weakn	esses and	Collaborations),)				
		weakne	esses and	streng	ths on poster p	papers for	Communicatio	on and				
		strengt	hs in	sharin	g		Research: Thro	ough group				
		learning	g the early				work and pres	entation				
		grade s	cience									
		lesson f	for the									
		period	unuer									
		TEVIEW										

	 Be able to reion lessons lessons lessons lessons lessons reinsights and/or grey a needing remains conception information fearlier (lesso 5) lessons 	flect P arnt a d state o fa areas edies on/mis m for m n 1 - n	rovide a reflection report on STS nd demonstrations and illustration n a given media of lessons learnt so ar resent concept maps and/or nodels linking nisconceptions/misinformation to ew insights	Equity and Reflection is developed from reflective activities Creativity and critical thinking are developed in developing models and concept maps
Content of lesson picked	Sub Topic	Time or	Teaching and learning to achieve	ve learning outcomes:
and developed from the		Stage	depending on delivery mode se	lected. Teacher led,
course specification			collaborative group work or inc	lependent study
Topic Title			Teacher Activity Facilitate and provide the necessary tools for student activities.	Student Activity
Course Review 1 with STS seminar	Reviewing the understanding of lessons 1-5 and discussion of observations during STS	60 minutes 90 minutes	Face-to-face: Teacher led brainstorming session with student teachers to unearth the weaknesses and strengths of student teachers in the lessons 1 – 5. Initiate discussion using groupings (Same ability and then mixed groups) to identify student teachers' strengths and weakness in the lessons learnt so far. STS Seminar: Teacher 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	Face-to-face: Student teachers discuss their problems in the previous lessons and provide a checklist to identify and record all possible weaknesses and strengths. STS Seminar: Student teachers listen to various presentations from their observation in STS on how science learning is conducted in the schools. 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.
	Remedies to course topics	30 minutes	STS. Face-to-face: Teacher 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/misinformatio n to new insights.
Which cross cutting issues	Equity and SEN: t	hrough mixed a	nd same group work to protect vul	nerable student teachers and
will be addressed or	establishing an in	teractive and in	iciusive classroom atmosphere.	
	inrougn modellin	ig and group Wo	ork, collaboration is established.	
Lesson assessments –	Student teac	ners' presentati	ions during group work and model	work presentation helps to
evaluation of learning: of,	assess them	oflearning		
the lesser	 Accoccmont f 	or and as loars	ing: Student toochors working in a	ouns on remodial tutoring halos
the lesson		or and as ledfl	arning	oups on remedial tutoring helps
	to assess the	in for and as lea	arning	
Teaching Learning Resources	Cardboards, Cour	se manual, Flip	charts, Poster paper	
Required Text (core)	Abbey, T. K., Alha	ssan, M. B., Am	eyibor, K., Essiah, J. W., Fometu, E	, &Wiredu, M.B. (2008). <i>Ghana</i>

	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.						
	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. Workshop on developing simple						
	teaching learning materials (improvisation)						
Course Assessment	⁹ Component 1: Subject Portfolio Assessment (30% overall score)						
	• Selected Item of Student work (3 items – 10%) = 30%						
	 Selected Item of Student work (3 items – 10%) = 30% Midterm assessment – 20% 						
	 Selected Item of Student work (3 items – 10%) = 30% Midterm assessment – 20% Reflective Journal – 40% 						
	 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) 						
	 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) ¹⁰Component 2: Subject Project (30% overall Semester 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) ¹⁰Component 2: Subject Project (30% overall Semester score) Introduction; a clear statement of aim and purpose of the project -10% 						
	 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) ¹⁰Component 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 						
	 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) ¹⁰Component 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% 						
	 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) ¹⁰Component 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% 						
	 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) ¹⁰Component 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% 						

 ⁹ See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP
 ¹⁰ See rubrics on Subject Project Assessment in Annex 6 of NTEAP

Year of B.Ed.	4	Semester	2	Place of lesson i	in semester	1 2 3 4 5 6 7 8 9 10 11 12					
Title of Langer		\M/ata=				2 11					
LITIE OF LESSON		water	Lesson Duration 3 Hours								
Lesson description		The lesson is des	igned to f	urther enhance th	e student teach	ers' knowledge and under	standing of				
		the aqua chemis	try, water	purification and v	vater uses and t	o enable them to better ap	opreciate how				
		these concepts of	these concepts can be taught to the JHS learner.								
Previous student tea	cher	Student teachers	s in the pr	evious lesson (less	on 5).						
(assumed)	rning										
Possible barriers to		Student teachers	s may alte	rnative explanatio	ns for water tre	atment and uses.					
learning in the lessor	า		-		1		1				
Lesson Delivery – cho	osen	Face- Practica	Work	- Seminarsv	Independent	e-learning	Practicum				
to support students i	in nos	to- Activity	Based	1	Study	opportunities					
achieving the outcon	lies		Learnii	ъ	V	V					
Lesson Delivery – ma	in	Face-to face: Dis	cussions,	demonstrations ar	nd observations	1	<u> </u>				
mode of delivery cho	osen	Seminar: Group	presentat	ions of reports and	d discussions						
to support student	h	Independent Stu	idy: stude	nt teachers Reflec	tions						
teachers in achieving	s the	e-learning Oppo	rtunities:	simulations, video	presentations						
Purpose for the lesso	on,	Deepening t	he studen	t teachers concep	tual understand	ling of Aqua chemistry					
what you want the	-	 Helping the 	Student te	eacher to be able t	o develop the r	ight conceptions for aqua	chemistry and				
students to achieve,		be able to te	each		-		-				
serves as basis for th	e	NITC									
expanded version of	the	NIS 1a) Critically	and collo	ctively reflects to i	improve toachir	and learning					
description.		1c: Demons	trates effe	ective growing lead	dership qualities	in the classroom and wide	er school.				
Write in full aspe	ects	Community	of Practic	e							
of the NTS addre	essed	2c: Has secu	re conten	t knowledge, peda	agogical knowle	dge and pedagogical conte	nt knowledge				
		for the scho	ol and gra	de they teach in.							
		2e: Underst	ands how	children develop a	and learn in dive	erse contexts and applies the	his in his or				
		3a: Plans an	,. d delivers	varied and challer	nging lessons, sh	nowing a clear grasp of the	intended				
		outcomes o	f their tea	ching.		5 <u>5 5 7 7 8 8 8</u>	-				
		3b: Carries o	out small-s	cale action resear	ch to improve p	ractice.					
		3d: Manage	s behavio	ur and learning wit	th small and larg	ge classes					
Learning Outcon	ne for	Learning Outcor	nes	Learning Indi	cators	Identify which cross- cu	tting issues.				
the lesson, picke	ed and					core and transferable sl	cills,				
developed from	the					inclusivity. Equity and a	ddressing				
course specificat	tion					diversity. How will thes	e be				
Learning indicate for each learning	ors					addressed or developed	1				
outcome	5										
		Demonstrate	knowled	ge • Present tab	les	Through group discussio	ons and				
		and unders	tanding	of illustration/	/concept	sharing of ideas in class	student				
		the applicati	ons wate	er. cartoons of	uses of water.	teachers develop the ski	ills of				
		(NTS 2c, p.	13, 3i, 3	Bi,		communication, collabo	ration and				
		p.14)				individual difference and	preciating Labilities				
						They also acquire skills i	n handling				
						devices, develop critical	thinking,				
						honesty, accuracy and re	esponsibility				
						through active participa work/discussion.	tion in group				

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				
Water	Recap of lesson 40 5 and Aqua minutes Chemistrys.		Face-to-face Tutor initiates a discussion with student teachers in whole group, on the key concepts of lesson 5 (Electrolytes and no	Face-to-face: Student teachers discuss the key concepts of lesson 5 and outline their strengths and weaknesses and expectations.				
		40 mins	Face-to-Face/e- learning:using videos and internet resources to engage student Teachers to introduce the concept aqua chemistry.	Face-to-Face: Student teachers view videos and internet resources and discuss the concept aqua chemistry				
	Purification of water, uses and economic importance of water	40 minutes	Face-to-face/e- Learning/Independent Study: Forming groups with 3 members of different abilities and strengths with the use of simulator/videos/multimedia and Tutor guides student teachers to discuss: • How to purify water for domestic and industrial use • Economic importance of water	 Face-to-face/e- Learning/Independent Study: Forming groups with 3 members of different abilities and strengths with the use of simulator/videos/multimediastudent teachers discuss: How to purify water for domestic and industrial use Economic importance of water 				
	Reflecting on how to teach Water to JHS learners	60 minutes	Face-to-face/Seminar: Tutor Maintaining groups with 3 members of different abilities and strengths and encouraging student teachers to micro teach using the concept of water	Face-to-face/E-learning opportunities: Student teachers maintain their groups of mixed abilities of 3 members to plan and do peer teaching/ micro teachinglesson on water to JHS learners				
Which cross cutting issues will be addressed or developed and how	Equity and SEN: the student teachers,	nrough appr establish an	opriate gender and equity sensit interactive and inclusive classro	ive group work to protect vulnerable oom atmosphere.				
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Assessment as I	earning: stu	dent teachers present Short less	ons water from the JHS curriculum				
Teaching Learning Resources	Simulations, video https://www.yout https://www.yout	os and multin tube.com/w tube.com/w	media, posters, projectors. atch?v=pjClihDmfeA, atch?v=ckYb53ZWwDk					
Required Text (core)	Abbey, T. K., Alhas association of scie Handbook for PD	ssan, B., Am ence teacher Coordinator	eyibor, K., Essiah, J. W., Fometu, s integrated science for senior hi s Themes 1 – 10.	E., &Wiredu, M.B. (2008). Ghana gh schools. Accra: Unimax MacMillan;				
Additional Reading List	Abbey, T. K., &Ess schools. Accra: Ur Ameyibor, K., &W	iah, J.W. (19 nimax Macm 'iredu, M. B. a: Unimax M	995). Ghana association of scienc illan. (2006). Ghana association of sci JacMillan.	e teachers physics for senior high ence teachers: chemistry for senior				

	Asabere-Ameyaw, A., & Oppong, E. K. (2013). <i>Integrated science for the basic school teacher I</i> . Winneba: IEDE.							
	Oddove, F. O. K., Taale, K. D., Ngman-Wara, F., Samlafo, V., &Obeng-Ofori, D. (2011), SWI							
	tegrated science for senior high schools: Students book Accra Ghana: Sam-Woode Ltd							
CPD Requirement	CoE Tutors need training on arranging on how to teach atomic and nuclear physics							
Course Assessment	¹¹ 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) 							
	¹² 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							

¹¹ See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP ¹² See rubrics on Subject Project Assessment in Annex 6 of NTEAP

Year of B	.Ed.	4	Semester	Semester 2 Place of lesson in semester 123456789					8 9 10 2	11 1	12		
Title of Les	son												
				Types o	of Climate an	d their effect on	food		Lesson Duration		3 Hours		
Lesson des	cription		Climate, whic	ch is an ag	gregation of	daily weather ch	anges influence	s agricı	ulture and	vege	etation		
			within our various communities and the world over. The way climate has affected crop production will be discussed with respect to the various climate types.										
Previous	student	teache	Students have experienced the occurrence of day and night and seasonal changes such										
knowledge (assumed)	e, prior	learnin	g the rainy	the rainy (wet) and dry seasons.									
Possible ba	arriers to l	earning	Misconce	eptions m	ay exist abo	out how student	s perceive the	occur	rence of t	he v	various		
in the lesso	on iver ch		weather	changes a	nd how they	affect food prod	luction	. I	mina				
Lesson Dei	udents in	osen to	Face-to-			Seminar	independent	e-leal	rtunities				
achieving t	the outcor	nes	lace	Activity			study	υρρυ	tunities				
Lesson D	elivery -	- mai	n Mixed group	activities,	discussions a	and reporting, de	monstration &	observ	ation.				
mode of d	lelivery ch	nosen t	ם ייש ס			1 0,							
support st	udent tea	chers i	า										
achieving	the	learnin	g										
outcomes.													
• What	VOU Wa	ont th	n This lesson i	s intende	d to help st	udents would d	emonstrate un	derstar	nding of th	ne c	limatic		
studer	its to	achieve	principles the	at affect	food produc	tion. It is also i	intended to fu	rther h	elp studer	nts o	embed		
serves	as basis	for th	e pedagogic co	ontent kn	owledge on	teaching and to	o acquire the i	requisit	e practica	ıl sk	ills for		
learnir	ng outcor	nes. A	n teaching the	effects of	the climate o	on food productio	on.						
expan	ded vers	sion o	f										
the de	scription.												
Write	in full as	pects o	f NTS										
the NT	S address	ea	1a) Critically	and collec	tively reflect	s to improve tead	hing and learni	ng					
			1c) Demonstr	rates effec	tive growing	leadership quali	ties in the class	room a	nd wider so	choc	ol.		
			Community c	of Practice									
			2c: Has secur	e content	knowledge,	pedagogical knov	vledge and peda	agogica	al content k	knov	vledge		
			for the schoo	l and grad	e they teach	in.							
			2e: Understa	nds how c	hildren deve	lop and learn in c	liverse contexts	and ap	oplies this i	in his	s or		
			3a) Plans and	delivers v	aried and ch	allenging lessons	showing a clea	ar orasr	of the int	endø	ed		
			outcomes of	their teacl	ning.			in Brash	of the life	cnut	cu		
			3b) Carries ou	ut small-so	ale action re	search to improv	e practice.						
			3d: Manages	behaviou	and learnin	g with small and	large classes)						
• Learni	ng Outcor	ne for	Learning Out	comes		Learning Indica	itors	Ident	ify the w	hich	cross		
the les	sson, picke	ed and						cuttir	ng issues-	cor	re and		
develo	oped from	the 						trans	ferable		skills,		
course	especifica	tion						diver	sivity, eq sity How	uity will	these		
• Learni	ng indicat	ors for	for aiversity. How								these		
each le	earning ou	utcome	Demonstrate	an appr	eciation of	Produce charts	, diagrams,	Equit	y and Inclu	isivit	ty:		
	0	_	misconceptio	ns assoc	iated with	and models that	at depict	Comr	nunication	,	critical		
			the effect of	types of	climate on	different types	of world	think	ing, coll	labo	oration,		
			food product	ion		climates		creat	ivity, ap	pre	ciation		
								and p	oroblem so	Iving	3.		

	Subtopic	Time or stage	Teaching and learning to ac	hieve learning outcomes:
			collaborative group work or ind	lependent study
Topic/Title			Teacher Activity	Student Activity
Types of Climate and their effect on food	Types of world climates	90 minutes	Open-ended questions for the identification of misconceptions associated with weather changes and climates Lecture, discussion, presentation, demonstration, Observations on internet, role play	Work in mixed groups to produce models and charts of different climates
	Effect of climates on food production	45 minutes	Teacher-led simulations	Simulations and multimedia presentations (ibox) Role play on climatic changes on food production (crops, fish, meat)
	Practical	45 minutes	Practical activity of effect of	Perform simple activities
	crop		pepper/okro/tomato	with seedlings under
	production		seedlings	different artificial weather conditions
Lesson assessments –	Short youtub	e videos, posters, repo	rts	
evaluation of learning: of,				
the lesson				
Teaching/learning	Charts, globe	, models, poster colo	ours and cards, patch of land or	pot for seedlings, poster
Resources	papers, interr	net		
Required Text (core)	Abbey, T. K.,	Alhassan, M. B., Ame	yibor, K., Essiah, J. W., Fometu,	E., & Wiredu, M.B. (2008).
	Ghana associ	ation of science t	eachers integrated science for s	senior high schools. Accra:
Additional Deading List	Unimax Mac	/lillan.		have abusiss for somior bigh
Additional Reading List	Abbey, T. K.,	aessian, J.w. (1995). (ools Accra: Unimax Ma	andrid dissociation of science teac	ners physics for senior high
	Ameyibor, K.,	& Wiredu, M. B. (2006	6). Ghana association of science to	eachers' chemistry for
	seni	or high schools. Accra:	Unimax MacMillan.	
	Asabere-Ame Win	yaw, A., & Oppong, E. neba: IEDE.	K. (2013). Integrated science for t	he basic school teacher I.
	Oddoye, E. O.	K., Taale, K. D., Ngma	n-Wara, E., Samlafo, V., & Obeng	-Ofori, D. (2011). SWL
	inte	grated science for seni	or high schools: Students book. A	ccra, Ghana; Sam-Woode
	Ltd.	8.7umdahl 6 A (200	0) Chamistry Balmant CA: Cana	and Loarning
CPD needs	Provision of i	., &Zumuam, S. A. (200 201	59). Chemistry. Beimont, CA. Ceng	age Learning.
Course Assessment	¹³ Component	1: Subject Portfolio A	ssessment (30% overall score)	
	Select	cted Item of Student w	vork (3 items – 10%) = 30%	
	• IVIIdt	erm assessment – 20%	0	
		nization of the Subject	t Portfolio- 10% (How its presente	od/organized)
	¹⁴ Component	2: Subject Project (30	% overall Semester score)	

 $^{^{\}rm 13}$ See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP $^{\rm 14}$ See rubrics on Subject Project Assessment in Annex 6 of NTEAP

	 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%
Co	mponent 3: End of Semester Examination – (40% overall Semester Assessment

Year of B.Ed.	4	S	emester	2	Plac	e of lessor	n in seme	ster	1 2 3 4 5 6 7 8 9 10 11			.1 12		
Title of Lesson				C	Climatio	effects or	nutritior	n in foods	5	Lesson Durat	ion	3 Hours		
Lesson descriptio	'n		This lesson looks at the relationship between climate, availability of nutrients and food production											
Previous stude knowledge, pri (assumed)	ent tea ior lear	cher ning	Learners know that adequate rain during the rainy season boosts food production and vice versa. They have also studied the water, carbon, hydrogen, phosphorus and nitrogen cycles.											
the lesson	to learnir	ig in	punishme	punishments from gods or evil deeds by community members										
Lesson Delivery – support students the outcomes	chosen t in achiev	o 'ing	Face-to- face	Prac Acti	ctical ivity	Work- Based Learning		Independ study	dent e	e-learning opportunities				
Lesson Delivery of delivery chose student teachers the learning outc	– main m en to sup in achie omes.	iode port ving	Mixed group	discus	ssions a	and reporti	ng, obser	vation, si	tuationa	ıl analysis (field	trips).			
 Overarching what you students to serves as bo learning ou expanded vo description. Write in fu the NTS additional statements 	outco want to achi basis for itcomes. ersion of Il aspect ressed	ome, the eve, the An the s of	Students em observations. This lesson is knowledge or change can ad NTS 1a) Critically a 1c) Demonstr Community o 2c: Has secure knowledge fo 2e: Understar teaching. 3a) Plans and outcomes of t 3b) Carries ou 3d: Manages	udents embark on field trip to various farms for whole class discussions on oservations. his lesson is intended to further help student teachers embed pedagogic content howledge on teaching and to acquire the requisite practical skills for teaching how clin hange can affect the value of food produce. TS a) Critically and collectively reflects to improve teaching and learning. c) Demonstrates effective growing leadership qualities in the classroom and wider sch formunity of Practice c: Has secure content knowledge, pedagogical knowledge and pedagogical content howledge for the school and grade they teach in. e: Understands how children develop and learn in diverse contexts and applies this in haching. a) Plans and delivers varied and challenging lessons, showing a clear grasp of the inter- utcomes of their teaching. b) Carries out small-scale action research to improve practice.							on their climate school.			
Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for							cross d tran /, equ ow t	cutting sferable uity and hese be						
each learnin	goutcom	e	Demonstrate effect of clim of the soil nutritive valu for farm anim	unde atic cl for p le of lals ar	erstandi hange blant c produc nd farm	ing of the on nature rops and ced crops ned fish	Report i forms	n diverse	e E S ii c p	Equity and Inclu Social nnovation, co critical thinkin problem solving	sivity: collat mmu g, ci	ooration, nication, reativity,		

	Subtopic	Time or stage	Teaching and learning to achieve learning outcomes:			
			depending on delivery	/ mode selected. Teacher led,		
			collaborative group wo	ork or independent study		
Topic/Title			Teacher Activity	Student Activity		
Climatic effects on nutrition in	Climate and	60 minutes	Teacher-led	Talk for on breaks in climatic		
foods	some natural		discussion on how	patterns and cycles		
	cycles		changes in cycles and			
			climates bear on			
			each other			
	Effect of	80 minutes	Put students in mixed	Pyramid discussion to		
	climatic		groups to discuss and	elucidate importance of		
	change on		share their	preserving nature and the		
	production of		experiences on how	environment for		
	nutrients		change in climate	sustainability		
			affects nutrient			
			production in			
			different spheres			
			(hydro, geo, etc)			
	Relationship	40 minutes	leacher-led	Short group presentations on		
	between		discussions on now	field trips and now nitrogen,		
	climate and		breaks in cycles	potassium and phosphorus		
	nroduction		anect climate and	affect food production		
	production		subsequently 1000			
Lesson assessments –	Reports posters	charts	resources			
evaluation of learning: of, for		s, charts				
and as learning within the						
lesson						
Teaching/learning Resources	Tools for drawin	ng, poster paper, pos	ter colour			
Required Text (core)	Abbey, T. K., Alh	assan, M. B., Ameyik	oor, K., Essiah, J. W., Fom	netu, E., & Wiredu, M.B. (2008).		
	Ghana associati	on of science te	achers integrated science	e for senior high schools. Accra:		
	Unimax MacMil	lan.				
Additional Reading List	Abbey, T. K., &I	Essiah, J.W. (1995). G	hana association of scier	nce teachers physics for senior		
	high so	chools. Accra: Unima	x Macmillan.			
	Ameyidor, K., &	wiredu, Wi. B. (2006). Grand association of si	cience leachers chemistry for		
	Asabere-Ameya	M Λ \mathcal{R} Oppong E k	(2012) Integrated scie	nce for the basic school teacher		
		neha: IFDF	. (2015). <i>Integrated</i> sele	ice for the busic school teacher		
	Oddove. E. O. K.	. Taale, K. D., Ngman	-Wara, E., Samlafo, V., &	Obeng-Ofori, D. (2011), SWL		
	integro	ated science for senic	or high schools: Students	book. Accra, Ghana; Sam-		
	Wood	e Ltd.	5			
	Zumdahl, S. S., 8	&Zumdahl, S. A. (200	9). <i>Chemistry</i> . Belmont, C	CA: Cengage Learning.		
CPD needs	Talk for learning	g approaches, pyrami	d discussion			
Course Assessment	¹⁵ Component 1:	Subject Portfolio As	sessment (30% overall so	ore)		
	Selecte	d Item of Student wo	ork (3 items – 10%) = 30%	6		
	Midter	m assessment – 20%				
	Reflect	ive Journal – 40%				
	 Organiz 	zation of the Subject	Portfolio- 10% (How its p	presented/organized)		
	¹⁶ Component 2:	Subject Project (309	% overall Semester score	e)		
	 Introdu 	uction; a clear staten	nent of aim and purpose	of the project -10%		

 ¹⁵ See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP
 ¹⁶ See rubrics on Subject Project Assessment in Annex 6 of NTEAP

 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

Year of B.Ed.	4	Se	emester	2	Plac	e of lessoi	n in semester	in semester 1 2 3 4 5 6			5 7 8 9 10 11 12	
Title of Lesson			Further	Studi	es on the	e Seconda	ry School Chem	nistry Curriculun	n	Lesson Duration	3 Hours	
Lesson descriptio	n		This lesson exposes students to salient or core concepts, misconceptions surrounding them and sequencing concepts for conceptual teaching and learning as well as pedagogies for best teaching practices.									
Previous stud knowledge, pr (assumed)	ent tea ior lea	acher rning	er Students have studied other curriculum and teaching strategies for various disciplines									
Possible barriers the lesson	to learnin	ıg in	Misconcept	tions	about so	me conce	pts and teachin	g practices				
Lesson Delivery – support students the outcomes	- chosen to in achiev	o ing	Face-to- face	P A	ractical ctivity		Seminar	Independent study			elearning	
Lesson Delivery of delivery chos student teachers the learning outc	– main r en to suj s in achi omes.	mode pport eving	Mixed grou	p act	ivities, di	scussions	and reporting,	demonstration,	obser	vation & rol	e play	
 What you students to a as basis for outcomes. version of th Write in full NTS addresse 	want achieve, so the lea An expa e descript aspects o ed	the erves rning nded ion. of the	 To deepen student teacher understanding of the curriculum, lesson preparation ar teaching. Test various pedagogical skills and cross – cutting issues Build the necessary knowledge on SEN and Gender issue To develop the knowledge to teach given topics NTS: 1a- Critically and collaboratively reflect to improve teaching and learning. 1f-Develops a positive teacher identity and acts as a good role model for students 2b-Has comprehensive knowledge of the official school curriculum, including learning outcomes 3e: Employs a variety of instructional strategies that encourages student participation arcitical thinking. 								n and ng on and multi-age	
 Learning Out lesson, picke developed fr specification Learning indi 	come for d and om the co	the ourse	Learning O	utcor	nes		Learning Indicators Identify the which cro cutting issues- core ar transferable skil inclusivity, equity ar diversity and how the				iich cross core and skills, uity and ow these	
each learning	goutcome	e	Demonstrate an appreciation of misconceptions associated with some chemical concepts and provide remediation for them through best pedagogical practicesList some concepts that are misconstrued and how to remediate themEquity and Communia thinking, creativity solving.							ity and Inclu imunication king, colla tivity and ing.	sivity: , critical boration, problem	
			Subtopic	Т	ime or st	tage	Teaching and depending of collaborative	l learning to ac n delivery mod group work or i	hieve le sel	learning o lected. Tea	utcomes: cher led, lv	
Topic/Title							Teacher Activ	ity	Stuc	lent Activity	.1	
Further Studies o Secondary Schoo Curriculum	n the I Chemist	ry	Trend of curriculum and main component	9 s	0 minute	25	Put students i analyse the er curriculum, lo patterns and must be over	n groups to ntire oking out for barriers that come	Wor asse sylla Talk app	k in mixed (ss sequer bus for roaches on	groups to ncing in learning how to	

	Formation	90 minutes	Open-ended questions for	prepare lessons that cater for special needs, equity and is conceptual- based Simulations and
	of night and day		the identification of misconceptions	multimedia presentations (ibox)
			Discussion, presentation, demonstration, Observations, role play	Prepare 30-minute e- lessons that demonstrate content and pedagogical issues enshrined in curriculum Role play on identification and correction of misconceptions
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Communicatio communicativ	on skills, analytical an /e skills, reflective skil	d deductive skills, demonstrations ls	on of acquired
Teaching/learning Resources	Curriculum			
Required Text (core)	Abbey, T. K., A Ghana associo Unimax MacN	Alhassan, M. B., Amey ation of science t Aillan.	vibor, K., Essiah, J. W., Fometu, teachers integrated science for	E., & Wiredu, M.B. (2008). senior high schools. Accra:
Additional Reading List	Abbey, T. K., high Ameyibor, K., seni Asabere-Ame I. Wi Oddoye, E. O. integ Woo Zumdahl, S. S.	&Essiah, J.W. (1995). schools. Accra: Unim & Wiredu, M. B. (200 or high schools. Accra yaw, A., & Oppong, E. inneba: IEDE. K., Taale, K. D., Ngma grated science for sen ode Ltd. ., &Zumdahl, S. A. (20	Ghana association of science te hax Macmillan. 16). Ghana association of science 1: Unimax MacMillan. . K. (2013). Integrated science fo an-Wara, E., Samlafo, V., & Obe hior high schools: Students book 09). Chemistry. Belmont, CA: Ca	eachers physics for senior e teachers' chemistry for or the basic school teacher ng-Ofori, D. (2011). SWL . Accra, Ghana; Sam- engage Learning.
CPD needs	Provision of it	DOX	, , , ,	
Course Assessment	 ¹⁷Component Select Midt Reflet Orga ¹⁸Component Intro Mether purp Subs Concord 	1: Subject Portfolio A sted Item of Student werm assessment – 20 ective Journal – 40% nization of the Subject 2: Subject Project (30 eduction; a clear state nodology; What the ose of the project – 2 tantive/Main section clusion – 30% : End of Semester Examples	Assessment (30% overall score) work (3 items – 10%) = 30% % ct Portfolio- 10% (How its prese 0% overall Semester score) ement of aim and purpose of the student teacher has done 20% a of the work – 40% amination – (40% overall Seme	nted/organized) ne project -10% and why to achieve the ster Assessment

 ¹⁷ See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP
 ¹⁸ See rubrics on Subject Project Assessment in Annex 6 of NTEAP

Year of B.Ed.	4	Semester	Semester 2 Place of lesson in semester				1 2 3 4 5 6 7 8 9 10 11 12						
Title of Lesson		C	o-planr	ning, co-tea	aching and	co-assessment	Lesson Duratio	on 3 Hours					
Lesson descriptio	n	In	terpret	ing, plannii	ng, executin	ig and assessing	g lessons taught ir	reflective mode					
Previous stude knowledge, prio (assumed)	nt teach or learni	ner Students have ng reflected over from week 1	Students have observed lessons in schools, co-taught with class teachers, co-assessed and reflected over these personal and dual activities. Thirty-minute lessons have been prepared from week 10.										
Possible barriers in the lesson	to learnin	g											
Lesson Delivery – support students achieving the out	chosen to in comes	Face-to-face		Practical Activity	Work- Based Learning	Independent study	e-learning opportunities	Practicum					
Lesson Delivery – of delivery chose student teachers the learning outc	main mo n to suppo in achievi omes.	de Mixed group ort ng	discus	sions and r	eporting, ol	oservation, role	play, situational a	analysis					
 Purpose of What you achieve Write in full 	the lesso want aspects	 Students work different te consideratio and for'. 	Students would identify parts of the curriculum, cast/enact them in role-play to depict different teaching and learning styles, reflect on them in pairs/groups (taking into consideration issues of inclusivity, gender and ability) and assess outcomes as learning 'of, as, and for'.										
the NTS addr	essed	 To deep Test var Build the To deve NTS: 1a- Critically 1f-Develops 2b-Has compoutcomes 3e: Employs critical think 3g: Employs classes 	 To deepen student teacher understanding of lesson preparation and teaching. Test various pedagogical skills and cross – cutting issues Build the necessary knowledge on SEN and Gender issue To develop the knowledge to teach the topic NTS: 1a- Critically and collaboratively reflect to improve teaching and learning. 1f-Develops a positive teacher identity and acts as a good role model for students 2b-Has comprehensive knowledge of the official school curriculum, including learning outcomes 3e: Employs a variety of instructional strategies that encourages student participation and critical thinking. 3g: Employs instructional strategies appropriate for mixed ability, multilingual and mult 										
 Learning Out the lesson, p developed fr course specif Learning indi each learning 	come for icked and om the ication cators for g outcome	Learning Ou	Learning Outcomes Learning Indicators Identify the work of the second seco										
		Demonstrate curriculum, assessment J Understand diverse cont execution of lesson	e u require procedu how exts ar f co-pla	inderstand ed pedago ures. learning nd apply th anned and	ing of ogies and occurs in is in their co-taught	In pairs co-pla co-assess and prepared 30-i lesson from w	in, co-teach, Eq co-reflect So ninute inr reek 10 co cri cre so	uity and Inclusivity: cial collaboration, novation, mmunication, tical thinking, eativity, problem lving and deduction					

	Subtopic	Time or stage	Teaching and learning	to achieve learning					
			Teacher led, collaborati	ve group work or					
Topic/Title			independent study						
Co-planning, co-teaching and			Teacher Activity	Student Activity					
co-assessment	Analysis of the	60 minutes	Teacher-led discussion on	Talk for learning					
	curriculum		salient components of the	approaches on					
			curriculum to consider as	structure of the					
			lesson	cumculum					
	Co-plan co-	90 minutes	Put students in pairs to	Small group					
	teach, and co-		enact the 30-minute	discussionsof					
	assess		lessons from week 10	outcome of					
			(Each teaches a 30-minute	practicum					
	Co. rofloat	20 minutes	lesson)	Disquesions					
	CO- reflect	30 minutes	reflective sessions	Discussions of paired					
				activities					
Lesson assessments –	Reports, samples o	f lesson notes, samples	of assessed exercises from le	sson					
evaluation of learning: of, for									
and as learning within the									
lesson	Curriculum Josson	Curriculum lesson notes internet (if nonvined) it							
reaching/learning Resources	Curriculum, lesson notes, internet (il requirea), ibox								
Required Text (core)	Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008)								
	Ghana association	of science teacher	rs integratea science for seni	or nign schools. Accra:					
Additional Reading List	Abbey, T. K., &Essi	iah, J.W. (1995). <i>Ghana</i>	association of science teache	rs physics for senior					
C C	high scho	ools. Accra: Unimax Mac	cmillan.	.,,,					
	Ameyibor, K., & Wi	iredu, M. B. (2006). <i>Gh</i> a	ana association of science tead	chers' chemistry for					
	senior hig	gh schools. Accra: Unim	ax MacMillan.						
	Asabere-Ameyaw, Winneba	А., & Oppong, Е. К. (20) : IEDE.	13). Integrated science for the	basic school teacher I.					
	Oddoye, E. O. K., T	aale, K. D., Ngman-War	a, E., Samlafo, V., & Obeng-Of	ori, D. (2011). <i>SWL</i>					
	integrate	d science for senior hig	h schools: Students book. Accr	a, Ghana; Sam-Woode					
	Ltd. Zumdahl S S &Zi	umdahl S A (2009) <i>Ch</i>	emistry Belmont CA. Cengag	e Learning					
CPD needs	Talk for learning ap	oproaches, pyramid disc	cussion						
Course Assessment	¹⁹ Component 1: Su	ibject Portfolio Assessm	nent (30% overall score)						
	Selected I	tem of Student work (3	items – 10%) = 30%						
	 Midterm a 	assessment – 20%							
	 Reflective 	Journal – 40%							
	Organizat	ion of the Subject Portf	olio- 10% (How its presented/	organized)					
	Component 2: Su	ibject Project (30% ove	erall Semester score)	viact 10%					
	Introduct Methodo	lon; a clear statement (logy: What the student	or ann and purpose of the pro	o achieve the nurnose					
	of the pro	bject – 20%	cacher has uone and why	is achieve the purpose					
	Substanti	ve/Main section of the	work – 40%						
	Conclusio	n – 30%							
	Component 3: End	of Semester Examinat	ion – (40% overall Semester /	Assessment					

 ¹⁹ See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP
 ²⁰ See rubrics on Subject Project Assessment in Annex 6 of NTEAP

Ye	ear of B.Ed.	.Ed. 4 Semester 2 Place of lesson in semester		r	1 2 3 4 5 6 7 8 9 10 11 12							
Title of Losser			Course Deview II with STS coming						Losson Duration 2 hours			
Lesson description			Course Review II with STS seminar					e second	half of	the semester as v	vell as	
		review and discussion of lessons learned, reflection and peer review of teaching and learning										
			portfolios.									
Previous student teacher			Lessons learnt from lesson 7 through lesson 11 in all learning approaches and experiences.									
knowledge, prior learning												
(assumed)												
Possible barriers to		ivisconception to some concepts not adequately dealt with. Pedagogical issues not appropriately										
Lesson Delivery – chosen		Face- Practical Work-Based Seminars Independen e-learning Practicum										
to s	upport stude	nts in	to-face	Activity	Lear	ning	V	t Stu	ıdy	opportunities		
ach	ieving the out	comes	V	v				v	-	V		
Less	son Delivery –	main	Face-to-F	ace: Discussi	on, grou	ip work	in same ability §	group wo	orks.			
mode of delivery chosen		Practical Activity: Modelling, Concept Mapping and Cartooning, Co-teaching and Co-planning.										
to support student			Independ	aent Study: Ti	utor and	studen	t teacher reflect	tions (ind	lividual	iy and collectively	()	
teachers in achieving the			Seminars: Presentation of reflections and micro teaching									
Purpose for the		Ascertain the level of pedagogical skills acquisition										
	lesson, what you want the students to		 Assess various skills and cross – cutting issues 									
			 Provide remedial tuition/tutorials on where necessary for experiences during lessons and 									
	achieve, serv	es as	planning and micro teaching									
	basis for the	learning	Correct misinformation									
	outcomes. A	n 	Build	the necessa	ry suppo	ort going	g forward on SEI	N and Ge	nder is	sue		
	expanded version of NTS											
	Write in full :	asnects	1a: Critically and collectively reflects to improve teaching and learning									
	of the NTS ac	dressed	2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledg									
of the wis addressed			3b: Carries out small-scale action research to improve practice.									
		3e: Employs a variety of instructional strategies that encourages student participation and critical										
		thinking.										
		3g: Employs instructional strategies appropriate for mixed ability, multilingual and multi-age										
			classes)									
•	Learning Out	earning Outcome		Learning Outcomes Learning Ind			ndicators	licators Identify cross – cuttir				
for the lesson,		n, picked	Learning Outcomes						and transferable skills, inclusivity.			
	and developed from the course								Equity and addressing diversity			
									and h	ow these will be	developed	
	specification	_	• Iden	tify weakness	5 •	Make	a list of weakne	esses	Collab	orations, Commu	inication	
•	Learning indi	cators	and	strengths in		and st	rengths on post	er	and R	esearch: Through	group work	
	Tor each lear	ni n g	acqu for t	usition of skill	IS	paper	s for snaring		anu p	resentation		
	Jucome		chen	nistry tonics f	or							
			the s	semester.								
			• Be a	ble to reflect	•	Provid	le a reflection re	eport	Equity	and Reflection is	developed	
			on le	essons and		on STS	and demonstra	ations	from i	reflective activitie	S	
			state	e new insights	5	and ill	ustrations on a	given				
			or gr	ey areas		media	of lessons learn	nt so				
			need	ling remedies	5	far						
			Bacir	for co		Drocor	at teaching and					
			Dasis nlan	ning and co-		learni	ng e-nortfolios					
			teac	hing		develo	bed throughou	t				
				σ		semes	iter.	-				

	 Correct misconception/misi nformation for earlier (lesson 7 – 11) lessons 	 Present conc and/or mode misconceptic tion to new in 	ept maps els linking ons/misinforma nsights	Creativ develo concep for tea	ity and critical thinking is ped in developing models, at maps and methodologies ching	
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 Activi	ty	Student Activity	
Course Review II			Facilitate and provides the necessary tool students' activ	for ities.		
	Reviewing the essence of co-planning and co- teaching.	60 minutes	Face-to-face: T led brainstorm session with st teachers to un weaknesses ar strengths of st teachers in STS InitiateTalk for learning appro using groups (S ability and mix	Futor ling cudent earth nd udent S.	Face-to-face: Student teachers discuss their experiences in the STS provide a checklist to identify and record all weaknesses and strengths.	
		70 minutes	groups). STS Seminar: 1 Uses mixed ab and mixed sex groupings to encourage stur- teachers to cro share and peer	Futor ility, dent oss r	STS Seminar: Student teachers Working in mixed groups and mixed sex groups co plan and cross share and later peer review their teaching skills.	
		20 minutes	Seminar: Student teacher peer review te and learning portfolios.	ers aching	Seminar: Student teachers peer review their e-portfolios as they cross share their portfolios	
	Remedies to course topics	30 minutes	Face-to-face: T groups studen teachers accor remedy need a provide specifi assistance in th areas needed.	Feacher t rding to and ic task he	Face-to-face: Students work in the special groups (Same remedy need group) on tasks to remedy their learning needs.	
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through r establishing an interactive	mixed and same gro e and inclusive class	oup work to prote sroom atmospher ation is establish	ect vulne re. ed	rable student teachers and	
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Keep students peer R be added to Assessm	eview ratings of the ent component 1.	eir co-teaching pl	lans for t	heir portfolio for marks to	
Teaching Learning Resources	Cardboards, Course manu	ual, Poster paper, Fl	ip chart stands.			

Required Text (core)	Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana</i> association of science teachers integrated science for senior high schools. Accra: Unimax					
	MacMillan.					
Additional Reading List	ading List Abbey, T. K., & Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high</i>					
	Amoultar K. S.Wirodu M. D. (2006). Chang according of science teachers chemistry for series					
	high schools. Accra: Unimax MacMillan.					
	Asabere-Ameyaw, A., &Oppong, E. K. (2013). <i>Integrated science for the basic school teacher 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	Workshop on preparation of checklist and Reflection guides.					
Course Assessment	²¹ 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) 					
	²² 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					
	Component of End of Semester Examination (40% Overan Semester Assessment					

 ²¹ See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP
 ²² See rubrics on Subject Project Assessment in Annex 6 of NTEAP

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