

YEAR 3

SEMESTER 1

Four-Year B.Ed. Course Manual

Science





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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 meets 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 this set 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 copy 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 approach used to produce this 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 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

Integrated Science III for Upper Primary Y3S1			
The vision for the New B.Ed. Curriculum			
The vision is to transform initial teacher education and train highly qualified, motivated new teachers who are effective, engaging and fully prepared to teach the basic school curriculum. This would improve the learning outcomes and life chances of all learners they teach as set out in the National Teachers’ Standards. In doing this, it would 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	Integrated Science III for Upper Primary		
Pre-requisite	Introduction to Integrated Science I, Introduction to Integrated Science II and Integrated Science I and II for Upper Primary school grade level		
Course Level	300	Course Code	Credit Value 3
1. Goal for the Subject or Learning Area			
The science programme is designed to transform the upper primary 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 upper primary school level.			
2. Course Description			
The course for semester one of year two, Integrated Science for Upper Primary III, uses the universal design for learning approach to extend the basic science concepts of the student teacher on the following content areas: flowers, fruits and seeds, air and water, human body systems, light, changes of state of matter and science curriculum studies. This is done through appropriate pedagogies such as Talk for learning approaches, demonstrations, concept mapping, problem-based teaching/learning and video presentations. Authentic assessments mode such as concept mapping, using checklist to identify values and attitudes and, mind maps from which provides for the teachers’ attention on the need to ensure equity and the provision for SEN will be used to evaluate the student teacher’s level of understanding and learning. This course emphasizes the essential attitudes and values 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 (NTS 1a -1c. p12;2c&2e, 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 primary 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 girls.			
The learning activities for this semester seeks to relate science to the learners’ environment, make science culturally relevant and inclusive. The course 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 early childhood (K –P3) to middle childhood (Upper Primary)			
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. Identify creative ways to teach flowers, fruits formation and dispersal as well as human body systems at the primary level(NTS 1b, 1d, 1g, p12: 2c, p.13 & 21)		<ul style="list-style-type: none"> Develop science related activities and experimental designs for upper primary learning on the concepts flowers, fruits, seed and their dispersal. 	
CLO2. Discuss; the composition of air, its uses and its properties, the nature of changes of state of matter and light as a form of energy. (NTS 3a, 3h, p14: NTS 2c, 2d, 2e, p13))		<ul style="list-style-type: none"> Create charts, concept maps and mind maps about Air and its properties as well as its uses 	
CLO3. Recognize the stages/phases of water cycle and discuss how the phases are related (NTS 3a, 3h, p14: NTS 2c, 2d, 2e, p13)		<ul style="list-style-type: none"> Present a mini project work water cycle and its implication to the environment. 	
CLO4. Demonstrate basic and higher level of thinking skills in		<ul style="list-style-type: none"> Prepare improvised, developmentally appropriate 	

planning to teach, assessment and reporting(NTS 3e, 3i, 3j, pg. 14)	lesson activities for teaching at the Upper Primary level		
CLO 5. Demonstrate ability to co-plan and deliver varied lessons in a differentiated and inclusive manner that will produce the intended learning outcomes (NTS, 2c & 3e, Pg. 14 finger & 24)	<ul style="list-style-type: none"> Prepare a reflective report on co planned lessons for teaching during STS for a seminar 		
7. Course Content			
Unit (Week)	Topic	Subtopic (if any)	Teaching and learning activity to achieve the learning outcomes
Week 1	<ul style="list-style-type: none"> Review of Year 2 integrated science 	<ul style="list-style-type: none"> Recap of year 2 lessons and challenges thereof. Introducing the course manual for the Y3S1 Upper Primary specialism 	<ul style="list-style-type: none"> Face-to-Face: Demonstrations and discussions on year 2 lessons and unique nature of the Integrated Science III for Upper Primary science specialism Face-to-Face: Scanning through Y3S1 CM and discussing the expectations for use of the Y3S1 Upper Primary Science CM
	<ul style="list-style-type: none"> Flowers and fruits 	<ul style="list-style-type: none"> Structure, function and uses of Flowers Pollination and fruit formation 	<ul style="list-style-type: none"> Face-to-Face: Shower thoughts, Manipulation (drawing from Nature) and reflecting on the structure and function of Flowers Nature walk and discussion of Pollination and fruit formation Video and online MOOCs viewing of pollination and fruit formation
Week 2	Seeds and Dispersal	<ul style="list-style-type: none"> Structure and function of Seeds Fruits and Seed Dispersal 	<p>Face-to Face: Drawing and group discussions of sorting (classifying)of seeds and seed types Nature walk and reflections variety of seeds, based on dispersal types of dispersals, Concept mapping of Seeds to dispersal types</p> <p>e-learning: Simulations, video and Computer presentation of Dispersal in nature</p>
Week 3	Pollination and Fertilization	<ul style="list-style-type: none"> Pollination and types Fertilization 	<p>Face-to Face: Discussions, Drawing and group presentations of types, nature and processes of Pollination and Fertilization in flowering plants</p> <p>e-learning: Video and Computer simulation on teaching activities and assessment strategies for teaching Pollination and fertilization of flowering Plants</p>
Week 4	Air and Water	<ul style="list-style-type: none"> Composition and properties of air and water Uses of air and water Conservation of water Water cycle 	<p>Face-to Face: Discussion, Role Playing, Construction of games, creating activities and materials for Air and Water</p> <p>e-learning: Video and Computer simulation on teaching activities and assessment strategies for teaching Air and Water.</p>
Week 5	Light	<ul style="list-style-type: none"> Light as a form of Energy Sources of, and Uses of Light 	<p>Face-to-face: Mixed group discussions and demonstrations/role plays, Concept Mapping and Cartooning about rust and rusting</p> <p>e-learning/Reflections: Video presentations from MOOCs with reflections on values such as Honesty, Accuracy, Precision and critical thinking.</p>
Week 6	Review and STS preparation 1	<ul style="list-style-type: none"> Reviewing and reflecting on lessons 1-lesson 5 STS Seminar 	<p>Face-to-face: Discussion, Talk for learning approaches with student teacher presentations on Learning achievements against CLOS and Challenges/Misconceptions that need clarifications</p>

			Seminar: Reflections and Presentations of reflections on learning against CLOs and on co planning and co teaching and reflection on Expectations for STS.
Week 7	Change of State of Matter I	<ul style="list-style-type: none"> • melting, • evaporation, • boiling, 	Face-to-face: Mixed group discussions and demonstrations/role plays, Concept Mapping and Cartooning about rust and rusting e-learning/Reflections: Video presentations from MOOCs with reflections on values such as Honesty, Accuracy, Precision and critical thinking.
Week 8	Change of State of Matter II	<ul style="list-style-type: none"> • condensation, • freezing and • sublimation 	Face-to-face: Mixed group discussions and demonstrations/role plays, Concept Mapping and Cartooning about rust and rusting e-learning/Reflections: Video presentations from MOOCs with reflections on values such as Honesty, Accuracy, Precision and critical thinking.
Week 9	Human Body Systems	<ul style="list-style-type: none"> • The Human Body • Organ Systems • Interdependence of the Organ Systems 	Face-to-face: Mixed group discussions and demonstrations/role plays, Concept Mapping and Cartooning about rust and rusting e-learning/Reflections: Video presentations from MOOCs with reflections on values such as Honesty, Accuracy, Precision and critical thinking
Week 10	Basic School Science Curriculum Studies I	<ul style="list-style-type: none"> • Teaching the Basic school curriculum • Science Pedagogies 	Face-to-face: Discussion, Talk for learning approaches with student teacher presentations on Science pedagogies Independent Study and Seminars: problem-based Lesson planning using the various pedagogies that integrates gender, equity and inclusive education strategies, and Seminars for peer reviewing
	Basic School Science Curriculum Studies II	<ul style="list-style-type: none"> • Lesson Planning and Co - Teaching 	Face-to-face: Discussion, Talk for learning approaches with student teacher presentations on Science lesson planning Independent Study and Seminars: problem-based Lesson planning that integrates gender, equity and inclusive education strategies, and Seminars for peer reviewing as well as micro teaching
Week 12	Course Review and STS Preparation 2	<ul style="list-style-type: none"> • Reviewing and reflecting on lessons 7- lesson 11 • STS Seminar 	Face-to-face: Discussion, Talk for learning approaches with student teacher presentations on Learning achievements against CLOS and Challenges/Misconceptions that need clarifications Seminar: Reflections and Presentations of reflections on learning against CLOs and on co planning and co teaching and reflection on Expectations for STS.
8. Teaching and Learning Strategies: Think, Pair, Share, Square, group Discussions, Checklist, Role Play activities, Multimedia presentations, Concept mapping, concept cartoons, video presentations, simulations and Computer assisted instructions, inquiry learning and field trips and seminars, rhyming and song constructions			
9. Course Assessment Components:			
Component 1: Subject Portfolio Assessment (30% overall score) <ul style="list-style-type: none"> • 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)

~~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% (of the 70% from the NTEAP)~~

CLO4, CLO5 AND CLO6

NTS:

1b) Improves personal and professional development through lifelong learning and Continuous Professional Development.

2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in.

3e) Employs a variety of instructional strategies that encourages student participation and critical thinking.

3j) Produces and uses a variety of teaching and learning resources including ICT, to enhance 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/Projects~~

~~Summary of Assessment Method: Practical Activities/Nature collections/ evidence of TLM designs/Group work appraisal/Evidence of equity and inclusivity/transferable skills during practical activities and as prescribed by University of affiliation~~

~~Core skills to be acquired: Honesty, carefulness, accuracy and tolerance, collaboration-~~

~~Weighting: 30% (of the 70% from the NTEAP)~~

~~e. g.: 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~~

~~Core skills to be acquired: collaboration, Honesty, carefulness, accuracy and tolerance,-~~

~~CLO1, CLO 2, CLO3, 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~~

~~2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in.~~

~~3e) Employs a variety of instructional strategies that encourages student participation and critical thinking.~~

~~3j) Produces and uses a variety of teaching and learning resources including ICT, to enhance learning~~

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

~~Component 3: Summary of Assessment Method: End of Semester Examination on key concepts as shown in the lessons and as prescribed by the University of affiliation.~~

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

Weighting: 40% (of the 70% from the NTEAP)

CLO1-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 thinking.

3i) Explains concepts clearly using examples familiar to students.

3j) Produces and uses a variety of teaching and learning resources including ICT, to enhance learning

<p>9. Required Reading and Reference List</p>
<p>NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra. Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i>. Accra: Unimax MacMillan. Abbey, T. K., &Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i>. Accra: Unimax Macmillan. Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers' chemistry for senior high schools</i>. 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). <i>SWL integrated science for senior high schools: Students book</i>. Accra, Ghana; Sam-Woode Ltd.</p>
<p>10. Teaching and Learning resources</p>
<p>Copies of Year two Semester two course manuals for the specialism, 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</p>
<p>11. Course related professional development for tutors/ lecturers</p>
<ul style="list-style-type: none"> • 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.

LESSON 1

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Flowers and fruits				Lesson Duration	3
Lesson description	This lesson reviews the year 2 integrated science concepts and introduces this course manual for year 3 with the view to help the student teacher transition into the co – planning and co-teaching the upper primary science curriculum. Also, the lesson will deepen the understanding of the basic concepts of plants through flowers and fruits. The lesson will expose them to teaching strategies and material so that they will effectively handle similar topics at the upper primary classrooms. This first lesson introduces student teachers to the course learning outcomes and the three assessment components of the course.					
Previous student teacher knowledge, prior learning (assumed)	Student teachers studied aspects of plants in year 1 and 2 course manuals					
Possible barriers to learning in the lesson	The season of the year may affect the availability of common flower species in the environment. However pictures obtained from the internet can be used as substitute					
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face √	Practical Activity	Work-Based Learning	Seminars	Independent Study √	e-learning opportunities √
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to-Face: Discussion, concept maps, Talk for learning approaches, nature walk and observation, jigsaw puzzles and presentations Independent study: Nature walk and recording e-learning opportunities: Video and MOOCs on variety of flowers and fruits					
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Student teachers deepen their knowledge on groups of plants Equip the student teacher with appropriate pedagogic skills to handle the topic in their future class Provide student teacher an understanding and appreciation of plants in the environment NTS: The teacher: 1a: Critically and collectively reflects to improve teaching and learning. 1b: Improves personal and professional development through lifelong learning and Continuous Professional Development. 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. 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 					
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes	Learning Indicators		Identify which cross – cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed		
	<ul style="list-style-type: none"> Link concepts in year two to new concepts in flowers and fruits Student teachers to sort flowers and fruits The student teacher should be able to co plan and co teach using concept of fruits and flowers 	<ul style="list-style-type: none"> Develop Concept Maps to link concepts from year 2 to new concepts yet to be developed Student teachers submit a chart on different types fruits and flowers Student teachers present reflective report on activities and materials for co planning and co teaching basic school 	<ul style="list-style-type: none"> Develop the skills of construction, aesthetics and critical thinking through identification and classification Develop the skills of construction of charts aesthetics and critical thinking through identification and classification Develop skills of construction 			

			concepts of flowers and fruits.	of checklist and critical thinking skills through identification of characteristics of leaves and stems of plant Reflection, Communication and Research: Through construction of charts
Content of lesson picked and developed from the course specification	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
Topic Title			Teacher Activity	Student Activity
	Introducing the Course Manual for Integrated Science III for Upper Primary	20 minutes	Face-to-Face: Tutor initiates shower thoughts discussion with student teachers to identify expectations for and introduce new course manual for Integrated Science III for Upper Primary to student teachers	Face-to-Face: Student teachers respond to discussions, noting their expectations, drawing from their experience with year 2 course manuals and focusing on the specialism for B4-B6 level specialism, discuss expectations for new CM
Flowers and Fruits	Review of Year 2 integrated science.	20 minutes	Face-to-face/Group activity: Tutor initiates a Pyramid discussion on the year 2 concepts with student teachers, and encourages them to reflect on the new concepts, the challenges and unique lessons	Face-to-face/Group activity: Student teachers work individually and in groups to discuss year two lessons, the challenges, unique values and produce a concept map of unique lessons learnt from year two semester 1 and semester 2 CMs for upper primary science lessons
	Flowers Fruits (B4.1.1.1.1, B4.1.1.1.2, B4.2.2.1.1)	40 minutes 40 minutes	Independent study/Face-to-face: Tutor led Nature walk for student teachers to collect different flowers and fruits for classification for which they will later make presentation in class for peer review. E-Learning: Video and Computer simulations to show to student teachers on the structure of Flowers, Fruits and Seed	Independent study/Face-to-face: Student teachers undertake Nature walk and later present sorted flowers and fruits charts for cross sharing on Uses and types. (B4.1.1.1.1, B4.1.1.1.2 and B4.2.2.1.1) E-Learning: Student teachers View video and computer simulations in mixed ability groups, note the structures and draw the structures and cross share with the larger class.
	Pollination and Fertilization (B4.1.1.1.1, B4.1.1.1.2, B4.2.2.1.1)	40 minutes	Face-to-face/Group activity: Tutor initiates shower thoughts discussions on Pollination and fertilization of flowering plants and allows Student teachers to Role play fertilization	Face-to-face/Group activity: Student teachers in diverse groups discuss Pollination and fertilization of flowering plants and Role play fertilization for intergroup discussions.

			for intergroup discussions.	
	Ways to present these concepts to the Primary school Learner	20 minutes	Face-to-face/Group activity: Tutor to guide student teachers to identify appropriate learning strategies they can use to present these concepts to primary school learners	Face-to-face/Group activity: In mixed ability /gender-based group, student teachers Identify appropriate strategies that can be used to deliver lessons for primary school learners using the concepts learned in this lesson.
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. Through the game of “Tell it”, Student – Teachers specific weakness and Strengths will be identified and catered for.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment of learning: student teachers Present drawing of Structure of Flowers and fruits 			
Teaching Learning Resources	The Course Manual, pictures of creeping, climbing and erect plants, collection of root systems of different plants (dicots and monocots) , jigsaw/puzzles on different leaves and stems of plants, Flip Charts, Ball, Pens, Pencils, ‘A’ 4 sheets, markers			
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.			
Additional Reading List	<p>Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers chemistry for senior high schools</i>. Accra: Unimax MacMillan.</p> <p>Asabere-Ameyaw, A., & Opong, E. K. (2013). <i>Integrated science for the basic school teacher I</i>. Winneba: IEDE.</p> <p>Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V., & Obeng-Ofori, D. (2011). <i>SWL integrated science for senior high schools: Students book</i>. Accra, Ghana; Sam-Woode Ltd.</p>			
CPD Requirement	Training on the use of concept maps and how to design learning activities for specific grade levels			
Course Assessment	<p>¹Component 1: Subject Portfolio Assessment (30% overall score)</p> <ul style="list-style-type: none"> 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) <p>²Component 2: Subject Project (30% overall Semester score)</p> <ul style="list-style-type: none"> 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% <p>Component 3: End of Semester Examination – (40% overall Semester Assessment)</p>			

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.	3	Semester	1	Place of lesson in semester	1	2	3	4	5	6	7	8	9	10	11	12
Title of Lesson	Seeds and Dispersal											Lesson Duration	3			
Lesson description	In this lesson, the Tutor will assist the student teachers to deepen their understanding of basic concepts of plants by exploring the seed structure and dispersal of seeds. The lesson will expose them to teaching strategies and material so that they will effectively handle similar topics in their future science classrooms. The student teacher will also appreciate the relationship between seed and plants.															
Previous student teacher knowledge, prior learning (assumed)	Student teachers exposed to seeds of various kinds in the environment.															
Possible barriers to learning in the lesson	Dispersal yields positive results when issues of the season of the year may affect the availability of common animal species in the environment. However pictures obtained from the internet can be used as substitute.															
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face √	Practical Activity	Work-Based Learning	Seminars	Independent Study √	e-learning opportunities √	Practicum									
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to-Face: Discussion, Talk for learning approaches, observation, brainstorming, open-ended questioning techniques and presentations Independent Study: Nature walk and Recording e- learning opportunities: Videos on dispersal of seeds															
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Tutor and student teachers to deepen their knowledge on Plants through seeds and dispersal Equip student teachers with appropriate pedagogic skills to handle the topic in their future class Student teacher develop an appreciation of animals in the environment <p>NTS: The teacher: 1a: Critically and collectively reflects to improve teaching and learning. 1b: Improves personal and professional development through lifelong learning and Continuous Professional Development. 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. 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</p>															
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes			Learning Indicators			Identify which cross – cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed									
	<ul style="list-style-type: none"> Student teachers to classify animals based on different movement, and habitats Student teachers to exhibit knowledge of body covering of animals through observation and 			<ul style="list-style-type: none"> Student teachers submit a chart on grouping of animals based on their different movement, habitats Student teachers present group reports on body covering of animals for whole class discussion Student teachers should present a report on uses of animals and pets and care of pets for whole class discussion 			Develop the skills of construction of charts, aesthetics and critical thinking through observation, identification and classification Develop the skills of open-ended questioning, skills of tolerance of different opinions, aesthetics and									

	<p>discussion</p> <ul style="list-style-type: none"> • Student teachers in inclusive mixed ability groups to brainstorm to come out with uses of animals and pets, and care of pets 		critical thinking through observation Develop skills of brainstorming techniques, report writing and presentation, communication and critical thinking skills
Content of lesson picked and developed from the course specification	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study
Topic Title			Teacher Activity Student Activity
Seeds and Dispersal (B4.1.1.1.1, B4.1.1.1.2, B4.2.2.1.1, B6.1.1.1.1)	Structure of seeds	70 minutes	<p>Face-to-face/Nature walk:Tutor led Nature walk for student teachers to observe, collect and record different types of seed in the environment.</p> <p>Tutor guides student teachers in mixed ability groups to use their observation and recordings to sort seeds into similarities and differences. Then later, they draw individually, at least a type of a seed.</p>
	Dispersal	80 minutes	<p>Face-to-face: Tutor uses open-ended questions to elicit student teachers’ knowledge gained through observation and daily experiences about how seeds are displaced regularly and haphazardly. Allow student teachers to watch short video clips on dispersal and discuss the video while comparing with their experiences in the environment (https://www.youtube.com/watch?v=qR1b7cYWc8k) (https://www.youtube.com/watch?v=qR1b7cYWc8k)</p>
	Ways to present these concepts to the Primary school Learner	30 minutes	<p>Face-to-face/Group work: Tutor guides student teachers in inclusive/gender groups to identify appropriate learning strategies they can use to present these concepts to primary school learners</p>
			<p>Face-to-face/Group work: Student teachers discuss from their own experiences, how seeds are easily displaced. In groups, student teachers view short video clips on Seed dispersal (Processes, purposes for dispersal and implication for reproduction in plants)</p> <p>Face-to-face/Group work: Mixed ability/gender group to identify and discuss appropriate learning strategies they can use to present these concepts to primary school learners. Values such as care, sincerity and cross cutting issue like innovation will be learnt through group work.</p>

Which cross cutting issues will be addressed or developed and how	ity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. Through the game of “Tell it”, Student – Teachers specific weakness and Strengths will be identified and catered for.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> • Assessment for learning: Student teachers to provide drawings on Seed types
Teaching Learning Resources	The Course Manual, Flip Charts, Ball, Pens, Pencils, ‘A’ 4 sheets, markers, short video clips from YouTube - (https://www.youtube.com/watch?v=qRlb7cYWc8k) (https://www.youtube.com/watch?v=qRlb7cYWc8k)
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.
Additional Reading List	Abbey, T. K., &Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i> . Accra: Unimax Macmillan. Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers chemistry for senior high schools</i> . 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). <i>SWL integrated science for senior high schools: Students book</i> . Accra, Ghana; Sam-Woode Ltd.
CPD Requirement	Training on observation skills, brainstorming techniques, report writing and how to design Learning activities for specific and inclusive multi-grade classroom

LESSON 3

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Pollination and Fertilization				Lesson Duration	3
Lesson description	This lesson will deepen the understanding of the basic concepts of plants through concepts in pollination and fertilization. The lesson will expose them to teaching strategies and material so that they will effectively handle similar topics at the upper primary classrooms.					
Previous student teacher knowledge, prior learning (assumed)	Student teachers studied seeds flowers and fruits in the previous lessons					
Possible barriers to learning in the lesson	The season of the year may affect the availability of common flower species in the environment. However pictures obtained from the internet can be used as substitute					
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face √	Practical Activity	Work-Based Learning	Seminars	Independent Study √	e-learning opportunities √
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to-Face: Discussion, concept maps, talk for learning approaches, nature walk and observation and presentations Independent study: Nature walk and recording e-learning opportunities: Video and MOOCs on variety of flowers and fruits					
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Student teachers deepen their knowledge on groups of plants Help the student teacher to be able to classify/group plants species using their characteristics Equip the student teacher with appropriate pedagogic skills to handle the topic in their future class Provide student teacher an understanding and appreciation of plants in the environment <p>NTS: The teacher: 1a: Critically and collectively reflects to improve teaching and learning. 1b: Improves personal and professional development through lifelong learning and Continuous Professional Development. 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. 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</p>					
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes		Learning Indicators		Identify which cross – cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed	
	<ul style="list-style-type: none"> Student teachers to explain the concepts Pollination and Fertilization Student teachers to identify the relevance of pollination and fertilization for plant life 		<ul style="list-style-type: none"> Student teachers develop a concept maps to explain concepts Pollination and Fertilization Student teachers submit relevance of the concepts pollination and fertilization for plant life on post it notes 		Develop the skills of construction, aesthetics and critical thinking through identification and classification Develop the skills of construction of charts aesthetics and critical thinking through identification and classification Develop skills of construction of checklist and critical thinking skills through identification of characteristics of leaves and stems of plant Reflection, Communication and Research: Through construction of charts	

Content of lesson picked and developed from the course specification	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
Topic Title			Teacher Activity	Student Activity
Pollination and Fertilization	Review lesson on seeds and dispersal.	20 minutes	Face-to-face/Group activity: Tutor initiates a Pyramid discussion on the lesson 2 concepts with student teachers, and encourages them to reflect on the new concepts, the challenges and unique lessons	Face-to-face/Group activity: Student teachers work individually and in groups to review lesson 2 concepts – Seeds and Dispersals, the challenges, unique values and produce a concept map of unique lessons learnt from lesson 2
	Pollination, Types and Processes (B4.1.1.1.1, B4.1.1.1.2, B4.2.2.1.1)	40 minutes	Independent study/Face-to-face: Tutor led Nature walk for student teachers to collect different flowers to observe for adaptations for pollination, and later will make presentation in class for discussion. Face-to-Face: Guide student teachers to do group discussions on the adaptations for pollination, structures for pollination, types of pollination and purpose for pollination	Independent study/Face-to-face: Student teachers undertake Nature walk to collect varieties of flowers, observe and record adaptations for pollination for presentation and cross sharing later in class. (B4.1.1.1.1. B4.1.1.1.2 and B42.2.1.1) Face-to-Face: student teachers do group discussions on the adaptations for pollination, structures for pollination, types of pollination and purpose for pollination. After they cross share their presentations from the nature walk
		60 minutes		
	Fertilization (B4.1.1.1.1, B4.1.1.1.2, B4.2.2.1.1)	40 minutes	Face-to-face/Group activity e-learning Opportunities: Tutor initiates shower thoughts discussions on fertilization of flowering plants and allows Student teachers to view short videos on fertilization for intergroup discussions. https://www.youtube.com/watch?v=dgFY7WUTASQ https://www.youtube.com/watch?v=3cmB7bnymnk	Face-to-face/Group activity: Student teachers in diverse groups discuss fertilization of flowering plants after they view short videos on fertilization.
Ways to present these concepts to the Primary school Learner	20 minutes	Face-to-face/Group activity: Tutor to guide student teachers to identify appropriate learning strategies they can use to present these concepts to primary school learners	Face-to-face/Group activity: In mixed ability /gender-based group, student teachers Identify appropriate strategies that can be used to deliver lessons for primary school learners using the concepts learned in this lesson.	
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. Through the game of “Tell it”, Student – Teachers specific weakness and Strengths will be identified and catered for.			
Lesson assessments – evaluation of learning: of, for and as learning within the	<ul style="list-style-type: none"> Assessment of learning: student teachers Present report on adaptations for Pollinations 			

lesson	
Teaching Learning Resources	The Course Manual, pictures of creeping, climbing and erect plants, collection of root systems of different plants (dicots and monocots) , jigsaw/puzzles on different leaves and stems of plants, Flip Charts, Ball, Pens, Pencils, 'A' 4 sheets, markers
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.
Additional Reading List	Abbey, T. K., &Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i> . Accra: Unimax Macmillan. Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers chemistry for senior high schools</i> . 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). <i>SWL integrated science for senior high schools: Students book</i> . Accra, Ghana; Sam-Woode Ltd.
CPD Requirement	Training on the use of concept maps and how to design learning activities for specific grade levels

LESSON 4

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Air and Water				Lesson Duration	3
Lesson description	This lesson is designed to equip the student teacher with requisite pedagogic knowledge, understanding and skills necessary to appreciate the air and water around them and to explain light as a form of energy. The lesson also introduces to the learner appropriate pedagogies and skills to be able to teach these concepts to upper primary learners					
Previous student teacher knowledge, prior learning (assumed)	Student teachers have studied the matter as a concept in earlier course manuals (year 1 and 2).					
Possible barriers to learning in the lesson	The spiritual con table can only be found in the compound form and may not be available for observation in the pure form.					
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face √	Practical Activity	Work-Based Learning	Seminar	Independent Study √	e-learning opportunities √
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to-Face: Discussion, Role Play, Independent Study: Inquiry Project for Student teachers to describe the water cycle and its implication to the upper primary learner. e-learning opportunities: Videos on Air, Water cycle and Light as a form of Energy					
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Get the conceptual understanding of water, air and Light as a form of energy. Discard the common misconceptions that student teachers have on light and the water conservation. <p>NTS: The teacher: 1a: Critically and collectively reflects to improve teaching and learning. 1b: Improves personal and professional development through lifelong learning and Continuous Professional Development. 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. 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</p>					
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes <ul style="list-style-type: none"> Describe and demonstrate knowledge of the uses of air and water in the environment. Design activities to identify light as a form energy Use inquiry approach to undertake a project requiring the description of the water cycle and how it can be demonstrated to upper primary learners to adapt to their environment. 	Learning Indicators <ul style="list-style-type: none"> Produce a report and chats on the uses of air and water in the environment. Designed activities to classification Light as a form of energy Present a project report on the description of the water cycle and how it can be demonstrated to upper primary learners. 	Identify which cross – cutting issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed <p>Sharing ideas in class, the Student teachers develop the skills of communication, collaboration and mutual respect why appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion, well handling of devices, honesty and accuracy.</p>			

Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
Air and Water (B5.1.2.2.1, B6.1.2.1.1, B6.1.2.2.1)	Air	140 minutes	<p>Face-to-face/Group activity Tutor guides student teachers to form groups of 3 members of mixed abilities to brainstorm, watch videos and perform activities to identify and describe the features (as matter) and composition of Air, Air movement and uses (https://www.youtube.com/watch?v=at6p_Eb1EHU) (https://www.youtube.com/watch?v=I3JtnoCnQ7w) Let Student Teachers try the activities specified in the video above to test the characteristics of air. (Ensure that different abilities and strengths/needs are catered for to ensure a safe working environment and equal opportunities)</p> <p>NB: Its Possible to give student teachers a project on designing activities to teach air properties to upper primary learners. (Optional)</p>	<p>Face-to-face/Group activity Student teachers work in groups to brainstorm and watch videos on the features (as matter) and composition of Air as well as Air movement. From the videos, student teachers, still working in their groups, perform the activities from the videos with guidance from the tutor to test the features of air. After the activities, Student teachers cross share their results and discuss air movements and uses of air within and across groups.</p>
	Water (B5.1.2.2.1, B6.1.2.1.1, B6.1.2.2.1)	40 minutes	<p>Face-to-face/Group activity Tutor guides student teachers, working in mixed ability groups to discuss the availability of water (Sources, Conservation and purification)and uses of water</p> <p>Independent Study: Student Teachers are then guided to undertake an Inquiry project to describe the Water cycle and how it can be demonstrated to upper Primary learners. (NB: Project to be submitted and cross shared during review meeting)</p>	<p>Face-to-face/Group activity Student teachers work in mixed ability groups to discuss the availability of water (Sources, Conservation and purification)and uses of water Independent Study:Student Teachers Note the Problem to inquire and discuss possible areas to collect data for the project.</p>
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through setting ground rules to protect vulnerable studentteachers and establishing an interactive and inclusive classroom atmosphere. Through the differentiation of metals and non-metals and how they react to become useful to society, student teachers’ accuracy, honesty and carefulness will be addressed.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Assessment as learning: Reports from activities within lesson for peer review.			

Teaching Learning Resources	Some resources that would be required to successfully enable an inclusive integrated science teaching would be Laboratory equipment, Chemicals, Smartphones, Tablets, Laptops, Desktop computer, Productivity tools (software that allow teachers to work better), Subject based instructional tools/applications. YouTube videos e.g. https://www.youtube.com/watch?v=ZQ2B-AyxZs
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.
Additional Reading List	Abbey, T. K., &Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i> . Accra: Unimax Macmillan. Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers chemistry for senior high schools</i> . 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). <i>SWL integrated science for senior high schools: Students book</i> . Accra, Ghana; Sam-Woode Ltd.
CPD Requirement	Training in improvisation and the use everyday simple materials to teach upper primary science

LESSON 5

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Light				Lesson Duration			3
Lesson description	This lesson is designed to equip the student teacher with requisite pedagogic knowledge and understanding of the skills to co plan and co teach the concept light as a form of energy to upper primary learners.							
Previous student teacher knowledge, prior learning (assumed)	Student teachers have studied the energy and energy types in year 1 and 2.							
Possible barriers to learning in the lesson	Misconception on energy forms.							
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face √	Practical Activity	Work-Based Learning	Seminar	Independent Study√	e-learning opportunities√		
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	The course will be delivered using the following methods: Face-to-face: Discussion, presentations (group/individual) Independent Study: Inquiry based learning on light properties e-learning opportunities: videos and computer simulations.							
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Discard the common misconceptions that student teachers have on light as a form of energy. Demonstrate understanding of the concept light. Designing activities and teaching resources to teach how to teach the concept light!!! NTS: The teacher: 1a: Critically and collectively reflects to improve teaching and learning. 1b: Improves personal and professional development through lifelong learning and Continuous Professional Development. 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. 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 							
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes		Learning Indicators		Identify which cross – cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed			
	<ul style="list-style-type: none"> Exhibit knowledge and understanding of the Concept Light as a form of energy Design activities to teach light to upper primary light. 		<ul style="list-style-type: none"> Produced reports and chats on the light and uses of light Designed activities to teach light. 		Sharing ideas in class, the Student teachers develop the skills of communication, collaboration and mutual respect why appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion, well handling of devices, honesty and accuracy.			
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			
Light (B5.1.2.2.1, B6.1.2.1.1, B6.1.2.2.1)	Sources of Light	30minutes	Face-to-face: Tutor guides student teachers to brainstorm on the concept of light, sources.		Face-to-face/Group activity: Student teachers work in mixed ability groups to brainstorm on the concept of light, sources.			

				Student teachers produce a report in groups on their brainstorming.
(B5.1.2.2.1, B6.1.2.1.1, B6.1.2.2.1)	Light properties and Uses	60 minutes	Face-to-face/Group activity: Tutor guides student teachers to discuss the properties and uses of light. Ask student teachers to view short videos and perform a small activity on some properties of light	Face-to-face/Group activity: student teachers to discuss the properties and uses of light. Ask student teachers to view short videos and perform a small activity on some properties of light.
(B5.1.2.2.1, B6.1.2.1.1, B6.1.2.2.1)	Ways to present these concepts to the Primary school Learner	90 minutes	Face-to-face/Group activity/ e-learning opportunities: Tutor guides student teachers in mixed ability groups, to discuss and design materials and activities that can be used to teach lights as a concept to upper primary learners. Use short videos to guide student teachers design the activities.	Face-to-face/Group activity/ e-learning opportunities: student teachers discuss ways by which materials and activities appropriate to the upper primary grade level can be developed and proceed to develop some for peer reviewing across groups. Student teachers work in their groups to do a 5-minutes micro teaching using the activities and materials developed.
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. Through the process of rusting and its prevention, student teachers' accuracy, honesty and carefulness will be addressed.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Assessment as learning: Student teachers build stock of materials on lights			
Teaching Learning Resources	Some resources that would be required to successfully enable an inclusive integrated science teaching would be Laboratory equipment, Chemicals, Smartphones, Tablets, Laptops, Desktop computer, Productivity tools (software that allow teachers to work better), Subject based instructional tools/applications.			
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.			
Additional Reading List	Abbey, T. K., &Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i> . Accra: Unimax Macmillan. Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers chemistry for senior high schools</i> . 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). <i>SWL integrated science for senior high schools: Students book</i> . Accra, Ghana; Sam-Woode Ltd.			
CPD Requirement	Training in sourcing appropriate multimedia resources for use in the upper primary science teaching			

LESSON 6

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12						
Title of Lesson	Review and STS preparation 1			Lesson Duration			3 Hours				
Lesson description	This lesson review student teachers learning of lessons 1 to lesson 5 against the CLOs for these lessons and discusses the expectations for STS. The lesson will enable student teachers to evaluate their own learning and guide them to the appropriate remedial process for effective learning as well as appropriately prepare them for STS.										
Previous student teacher knowledge, prior learning (assumed)	Student teachers had lessons in the concepts from the beginning of the semester.										
Possible barriers to learning in the lesson	Student teachers may: <ul style="list-style-type: none"> • Have misconceptions of concepts • Have challenges in the learning period that may not have been identified by tutors. 										
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face ✓	Practical Activity ✓	Work-Based Learning	Seminars	Independent Study ✓	e-learning opportunities ✓	Practicum				
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to Face: Discussion, Tutor and student teachers’ interactions on the functions of simple machines Seminars: Reflective report presentations Independent Study: Inquiry and reflections e-learning opportunities: Use of internet, simulations and video presentations										
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Correct misconceptions and obtain appropriate remedial lessons • Prepare adequately at this level for STS • Demonstrate the skill in teaching the subject matter <p>NTS: The teacher:</p> <p>1a: Critically and collectively reflects to improve teaching and learning.</p> <p>1b: Improves personal and professional development through lifelong learning and Continuous Professional Development.</p> <p>1c: Demonstrates effective growing leadership qualities in the classroom and wider school.</p> <p>2b Has comprehensive knowledge of the official school curriculum, including learning outcomes</p> <p>2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in.</p> <p>2e: Understands how children develop and learn in diverse contexts and applies this in his or her teaching</p>										
<ul style="list-style-type: none"> • Learning Outcome for the lesson, picked and developed from the course specification • Learning indicators for each learning outcome 	Learning Outcomes		Learning Indicators		Identify which cross – cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed						
	<ul style="list-style-type: none"> • Identify Learning Challenges and be able to obtain appropriate remedies for learning against the CLOs • Prepare, within the scope of the content so far, for STS 		<ul style="list-style-type: none"> • Present Reflective reports of learning against the CLOs • Provide report for the expectations for STS 		Correct/ handling and uses of devices, good identification of tools for measurements, sharing ideas in class, Student teachers develop skills of communication, collaboration and mutual respect while appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion.						

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
Review and STS preparation 1	Review of Lesson 1 – Lesson 5	90 minutes	<p>Face-to-face: Tutor introduces the lesson by allowing Student teachers to reflect and summarize the previous week’s lesson.</p> <p>Face-to-face: Tutor uses open-ended questions to elicit misconceptions/incorrect/naive ideas about Concepts in Previous lesson. Use Probing questions to help clarify Misconceptions/Incorrect/naive ideas from previous lesson</p> <p>Face-to-face/Group activity: Tutor guides studentteachers to form groups of 3 members each, or more depending on class size, (mixed intellectual ability/gender-based) to reflect and write a reflective report on learning challenges to attaining the CLOs from the previous lessons and how they will suggest remedies and actions for learning to Occur. The reflection should include how that will impact on the upper primary learner too.</p> <p>Face-to-face/E-learning opportunities: Tutor allows studentteachers to do short power point/poster/post it sticker presentation of their reflection for cross sharing.</p>	<p>Face-to-face: Student teachers reflect and summarize the previous week’s lesson.</p> <p>Face-to-face: Student teachers answer open-ended questions to bring their misconceptions/incorrect/naive ideas about Previous lessons for further discussions and clarifications and relearning</p> <p>Face-to-face/Group activity: student teachers in groups of 3members each (mixed intellectual ability/gender-based) to reflect and write a reflective report on learning challenges to attaining the CLOs from the previous lessons and how they will suggest remedies and actions for learning to Occur for them and the upper primary learner</p> <p>Face-to-face/Group activity: Student teachers in groups do power point/poster/post it sticker presentation of their reflection for cross sharing.</p>
	STS Preparation	90 minutes	<p>Face-to-Face/E-learning/Independent study: Tutor allows individual student teachers to search online resources for use of science subject portfolio and reflective journal as well as discuss in groups (mixed gender) how to plan with the concepts for co teaching https://www.youtube.com/watch?v=sacuuqjHPXo https://www.youtube.com/watch?v=0nKR0kuDYHM</p>	<p>E-learning/Independent study: Individual student teachers search online resources for use of science subject portfolio and reflective journal as well as discuss in groups (mixed gender) how to plan with the concepts for co teaching</p>
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. By practicing with measuring of area/volume of plane figures and also doing online research on the correct vocabulary of mass and weight of objects, student–teachers’ difficulties in manipulating/handling/measuring/vocabulary usage skills will be addressed.			

Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Assessment of learning: Reflective reports and co planned lessons with similar concepts from the basic school curriculum
Teaching Learning Resources	match box, cubes of sugar, chalk box, exercise books, manila cards multimedia resources. YouTube videos e.g. https://www.youtube.com/watch?v=sacuuqjHPXo https://www.youtube.com/watch?v=0nKR0kuDYHM
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan; Handbook for PD Coordinators Themes 1- 10
Additional Reading List	Abbey, T. K., &Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i> . Accra: Unimax Macmillan. Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers’ chemistry for senior high schools</i> . 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). <i>SWL integrated science for senior high schools: Students book</i> . Accra, Ghana; Sam-Woode Ltd.
CPD Requirement	Training in selecting appropriate e-resources for teaching upper primary school lessons.

LESSON 7

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Change of States of Matter I				Lesson Duration		3 Hours
Lesson description	This lesson deepens the student teachers understanding of the concept Matter studied in Year 1 semester 1 (lesson 4). The student teacher will be exposed to how matter can change from one state to another. The teacher will be guided to identify and develop appropriate activities that are gender friendly and socially inclusive to support all learning at the upper primary level.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers have studied matter in year 1 semester 1 (lesson 4).						
Possible barriers to learning in the lesson	Possible misconceptions about evaporation occurring only at high temperatures.						
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face ✓	Practical Activity ✓	Work-Based Learning	Seminars	Independent Study ✓	e-learning opportunities ✓	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to face: Discussions, demonstrations and observations, Group work and designing Independent Study: inquiry and 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. <ul style="list-style-type: none"> Write in full aspects of the NTS addressed 	<ul style="list-style-type: none"> Get the conceptual understanding of change of states Discard the common misconceptions that evaporation is the result of heating or boiling Designing activities to teach change of state in the upper primary classroom NTS: 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes p.12, 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. p.13 & 21)						
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes		Learning Indicators		Identify which cross- cutting issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed		
	<ul style="list-style-type: none"> explain Boiling, evaporation and condensation as would be presented to primary learners Identify and give examples of everyday occurrences of evaporation and condensation. Develop activities to co plan lessons in the concepts Boiling, Evaporation and Condensation Demonstrate understanding of the topic and be able to teach 		<ul style="list-style-type: none"> Present concept maps to illustrate the meaning of the concepts Produce charts of everyday occurrences of convection for their personal portfolio Presents simple learning materials (models, designs) and lesson plans on the concepts 		Through 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 achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
Change of State of Matter (B5.4.1.2.1)	Reviewing lesson 4 form Year 1 semester 1.	30 minutes	Face-to-face/Group activity: Teacher puts student teachers in groups of 5 (any number depending on class size) to brainstorm and discuss the states of matter and how related they are after viewing a short video (refer to video link below) Allow each group 5 minutes to present their findings https://www.youtube.com/watch?v=wyRy8kowyM8	Face-to-face/Group activity: Student teachers brainstorm and discuss the states of matter and how related they are after viewing a short video. Student teachers use concept maps to relate the various state of matter. Groups present their findings to the class. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Boiling, Evaporation and Condensation	90 minutes	Face-to-face/Group activity: Teacher led group discussions on Boiling, using examples from lesson 8 (application of convection current) , evaporation and condensation. Assist student teachers to design a simple experiment with boiling water (a straw can be used to colour the bottom of the water) to demonstrate Boiling, Evaporation and condensation. The activities should also be used to explain the beads of sweat on cold bottles and glass windows	Face-to-face/Group activity: Student teachers use shower thoughts/discussions on boiling, evaporation and condensation. Design activities to demonstrate boiling water using colour at the base, evaporation and Condensation. Use the activities on condensation to explain the beads of sweat on cold bottles and glass windows. Present these activities in a report for peer review. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Ways to teach the concepts (B5.4.1.2.1)	60 minutes	Face-to-face/Group activity: Guide Student teachers (grouped in separate gender abilities) to use the activities designed to plan science lesson for upper primary teaching. Emphasize on gender equity and social inclusive lessons. Aske them to cross share for peer review/critique.	Face-to-face/Group activity: Student teachers (grouped in separate gender abilities) use the activities designed from step two above to plan science lesson for upper primary teaching. Noting gender equity and social inclusive language, materials, structures (group arrangements etc) lessons. Student Teachers cross share their lesson plans for peer review/critique.
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through appropriate gender and equity sensitive group work to protect vulnerable studentteachers, establish an interactive and inclusive classroom atmosphere			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment of learning: Presentation and peer reviewed Lesson activities and plans 			
Teaching Learning Resources	Cardboards, poster papers, beakers or cooking pans, source of heat, poster colours, phones, tablets, desktop computers with internet access. https://www.thoughtco.com/convection-currents-definition-and-examples-4107540			
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra			

	Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan; Handbook for PD Coordinators Themes 1 – 10. SCIENCE CURRICULUM FOR PRIMARY SCHOOLS (BASIC 4 - 6), SEPTEMBER 2019
Additional Reading List	Abbey, T. K., & Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i> . Accra: Unimax Macmillan. Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers: chemistry for senior high schools</i> . 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). <i>SWL integrated science for senior high schools: Students book</i> . Accra, Ghana; Sam-Woode Ltd.
CPD Requirement	Training on designing experiments for primary science teaching.

LESSON 8

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Change of States of Matter II						Lesson Duration	3 Hours
Lesson description	This lesson deepens the student teachers understanding of the concept Matter studied in Year 1 semester 1 (lesson 4). The student teacher will be exposed to how matter can change from one state to another. The teacher will be guided to identify and develop appropriate activities that are gender friendly and socially inclusive to support all learning at the upper primary level.							
Previous student teacher knowledge, prior learning (assumed)	Student teachers have studied Change of states I in lesson 7.							
Possible barriers to learning in the lesson	Possible misconceptions about evaporation occurring only at high temperatures.							
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face ✓	Practical Activity✓	Work-Based Learning	Seminars	Independent Study✓	e-learning opportunities ✓	Practicum	
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to face: Discussions, demonstrations and observations, Group work and designing Independent Study: inquiry and 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. <ul style="list-style-type: none"> Write in full aspects of the NTS addressed 	<ul style="list-style-type: none"> Get the conceptual understanding of change of states Discard the common misconceptions that sublimation is the result of heating or boiling Designing activities to teach change of state in the upper primary classroom NTS: 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes p.12, 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. p.13 & 21)							
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes		Learning Indicators		Identify which cross- cutting issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed			
	<ul style="list-style-type: none"> explain melting, freezing and sublimation as would be presented to primary learners Identify and give examples of everyday occurrences of Condensation and sublimation. Develop activities to co plan lessons in the concepts Boiling, Evaporation and Condensation Demonstrate understanding of the topic and be able to teach 		<ul style="list-style-type: none"> Present concept maps to illustrate the meaning of the concepts Produce charts of everyday occurrences of condensation for their personal portfolio Presents simple learning materials (models, designs) and lesson plans on the concepts 		Through 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 achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
Change of State of Matter II (B5.4.1.2.1)	Reviewing lesson 7.	30 minutes	Face-to-face/Group activity: Teacher puts student teachers in groups of 5 (any number depending on class size) to brainstorm and discuss lesson 7 (refer to video link below) Allow each group 5 minutes to present their findings https://www.youtube.com/watch?v=wyRy8kowsyM8	Face-to-face/Group activity: Student teachers brainstorm and discuss the lesson 7 and link it to this new lesson. Groups present their findings to the class. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	melting, freezing and sublimation	91 minutes	Face-to-face/Group activity: Teacher led group discussions on Boiling, using examples from lesson 8 (application of convection current) on melting, freezing and sublimation. Assist student teachers to design a simple experiment with to demonstrate melting, freezing and sublimation.	Face-to-face/Group activity: Student teachers use shower thoughts/discussions on melting, freezing and sublimation. Design activities to demonstrate melting, freezing and sublimation. Present these activities in a report for peer review. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Ways to teach the concepts (B5.4.1.2.1)	31 minutes	Face-to-face/Group activity: Guide Student teachers (grouped in separate gender abilities) to use the activities designed to plan science lesson for upper primary teaching. Emphasize on gender equity and social inclusive lessons. Ask them to cross share for peer review/critique.	Face-to-face/Group activity: Student teachers (grouped in separate gender abilities) use the activities designed from step two above to plan science lesson for upper primary teaching. Noting gender equity and social inclusive language, materials, structures (group arrangements etc) lessons. Student Teachers cross share their lesson plans for peer review/critique.
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through appropriate gender and equity sensitive group work to protect vulnerable studentteachers, establish an interactive and inclusive classroom atmosphere			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment of learning: Presentation and peer reviewed Lesson activities and plans 			
Teaching Learning Resources	Cardboards, poster papers, beakers or cooking pans, source of heat, poster colours, phones, tablets, desktop computers with internet access. https://www.thoughtco.com/convection-currents-definition-and-examples-4107540			
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan; Handbook for PD Coordinators Themes 1 – 10. SCIENCE CURRICULUM FOR PRIMARY SCHOOLS (BASIC 4 - 6),SEPTEMBER 2019			

Additional Reading List	<p>Abbey, T. K., & Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i>. Accra: Unimax Macmillan.</p> <p>Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers: chemistry for senior high schools</i>. Accra: Unimax MacMillan.</p> <p>Asabere-Ameyaw, A., & Oppong, E. K. (2013). <i>Integrated science for the basic school teacher I</i>. Winneba: IEDE.</p> <p>Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V. & Obeng-Ofori, D. (2011). <i>SWL integrated science for senior high schools: Students book</i>. Accra, Ghana; Sam-Woode Ltd.</p>
CPD Requirement	Training on designing experiments for primary science teaching.

LESSON 1

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Teaching Ventilation II				Lesson Duration	3 Hours
Lesson description	The lesson is designed to provide the student teachers with the relevant learning experiences and technological skills that will enable them to teach creatively through hands-on exploratory learning activities and effective authentic assessment. It is also structured to enable them to learn about the human body system as will be presented to the Upper primary learner.					
Previous student teacher knowledge, prior learning (assumed)	Student teachers are aware of their bodies.					
Possible barriers to learning in the lesson	Possible misconceptions about the human body.					
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face ✓	Practical Activity	Work-Based Learning	Seminars	Independent Study	e-learning opportunities ✓ Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to face: Discussions, demonstrations and observations, Group work and designing Independent Study: Inquiry and 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	<ul style="list-style-type: none"> Get the conceptual understanding of Body Organs Discard the common misconceptions that student teachers have about the Human Body Designing activities to teach the Human Body systems NTS: 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes p.12, 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. p.13 & 21					
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes	Learning Indicators		Identify which cross- cutting issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed		
	<ul style="list-style-type: none"> Define and explain the human body systems 	<ul style="list-style-type: none"> Drawing of parts of the Human Body Systems 		Through 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.		
	<ul style="list-style-type: none"> Identify the relationship of the organs of the Human Body System 	<ul style="list-style-type: none"> Concept maps showing relationship between the human body systems 				
<ul style="list-style-type: none"> Demonstrate understanding of the topic and be able to teach. 	<ul style="list-style-type: none"> Present reflective reports on lesson materials developed. 					

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
The Human Body System (B5.4.1.2.1)	Organ Systems and their Functions	90 minutes	Face-to-face/Group activity: Put student teachers into different ability group to brainstorm and discuss the structure of the Human Body system using Diagram, Pictures and videos as guide.	Face-to-face/Group activity: Student teachers working in groups, discuss the structure of the Human Body parts using diagrams, Pictures and Models provided by the tutor as guide. Each group draw the parts and cross share later Groups make 5-minutes presentations of their drawings to the class. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Organization and Interrelatedness of the Organs in the Human Body systems	45minutes	Face-to-face/Group activity: Teacher led Provide short videos for the students, working in their groups, to view discuss and draw concept maps to show how related the organs and cells are relayed in the Human Body systems. (The groups should be inclusive, multi-age, and developmentally appropriate). https://www.youtube.com/watch?v=i5aXwiC3wWc https://www.youtube.com/watch?v=GYtJKrbqhiQ Guide the groups to later cross share their concept maps.	Face-to-face/Group activity: Student teachers working in their groups, view, short videos on the structure of the organs in the Human Body, discuss and draw concept maps to show how related the organs and cells are related in the Human Body systems. Student teachers cross share their concept maps to the larger groups. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Ways to teach these Concepts	45minutes	Face-to-face/Group activity: Guide discussion on developing activities to co plan and co teach using concepts of human body systems Require of student teachers to develop models of how to present the activities to primary school learners.	Face-to-face/Group activity: Discuss in mixed ability groups how to develop activities to co plan to teach upper primary learners about the Human Body systems and make 2-minute presentations of the models.
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through appropriate gender and equity sensitive group work to protect vulnerable student teachers, establish an interactive and inclusive classroom atmosphere			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment of learning: Presentation of Models of activities and drawings of Human Body Systems 			
Teaching Learning Resources	Cardboards, poster papers, poster colours, phones, tablets, desktop computers with internet access.			
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan; Handbook for PD Coordinators Themes 1 – 10.			

Additional Reading List	<p>Abbey, T. K., &Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i>. Accra: Unimax Macmillan.</p> <p>Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers: chemistry for senior high schools</i>. Accra: Unimax MacMillan.</p> <p>Asabere-Ameyaw, A., & Oppong, E. K. (2013). <i>Integrated science for the basic school teacher I</i>. Winneba: IEDE.</p> <p>Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V.& Obeng-Ofori, D. (2011). <i>SWL integrated science for senior high schools: Students book</i>. Accra, Ghana; Sam-Woode Ltd.</p>
CPD Requirement	Training on developing modelling concepts into concrete models.

LESSON 10

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Science Curriculum Studies- Pedagogies				Lesson Duration	3 Hours	
Lesson description	Science learning at the basic school can be challenging to the learning especially the early adolescent. This lesson looks at how to identify and use challenging , hand on pedagogies to facilitate learning at the upper primary level.						
Previous student teacher knowledge, prior learning (assumed)	Learners model lessons and materials for the primary learner from previous lessons and have an idea of the transition in growth from childhood to adulthood from lesson 10 and 11 from year 2 semester 1						
Possible barriers to learning in the lesson	Student teachers may: <ul style="list-style-type: none"> Have misconceptions about age appropriate learning 						
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face ✓	Practical Activity	Work-Based Learning	Seminars ✓	Independent Study ✓	e-learning opportunities ✓	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to Face: Discussion, Student groups interactions on concepts of age appropriate learning Independent Study: Inquiry and reflections e-learning opportunities: Use of internet, simulations and video presentations Seminar: Reflective presentations						
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Student teachers will adopt much positive outlook to deal with early adolescent crises and learning difficulties <p>NTS:</p> <p>1b) Improves personal and professional development through lifelong learning and Continuous Professional Development</p> <p>2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes.</p> <p>2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in.</p> <p>2e) Understands how children develop and learn in diverse contexts and applies this in his or her teaching</p> <p>3f) Pays attention to all learners, especially girls and students with Special Educational Needs, ensuring their progress.</p> <p>3g) Employs instructional strategies appropriate for mixed ability, multilingual and multi-age classes.</p> <p>3h) Sets meaningful tasks that encourages learner collaboration and leads to purposeful learning</p>						
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes		Learning Indicators		Identify which cross – cutting issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed		
	<ul style="list-style-type: none"> Explain the developmental appropriate learning pedagogies for science learning. (NTS 2c, p.13 & 21), (NTS 2c, p.13 & 21), (NTS 2b, p.12, 2c, p.13 & 21) 		<ul style="list-style-type: none"> Produce a chart showing developmentally appropriate pedagogies for upper primary science learning. 		Student teachers develop skills of communication, collaboration and mutual respect while appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion.		

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
Science Curriculum - Pedagogies	Reviewing Activities for teaching in lesson 9 and transition to early adolescent learning from Lesson 10 and 11, year 2 semester 1.	40 minutes	<p>Face-to-face: Tutor introduces the lesson by reviewing Student teachers' relevant previous knowledge on adolescent learning (lessons 10 and 11, year 2 semester 1)</p> <p>Face-to-face: Open-ended questions to review teaching activities and model from lesson 9</p>	<p>Face-to-face: Student teachers discuss their previous knowledge on the adolescent learning and behaviour from previous lessons.</p> <p>Face-to-face: Student teachers answer open-ended questions to review teaching learning activities from lesson 9.</p>
	Developmentally Appropriate and inclusive pedagogies for science learning	140 minutes	<p>Face-to-face/e-learning opportunities/independent Study: Put student teachers in mixed gender groups, provide short videos on inclusive and gender appropriate pedagogies for science learning and allow student teachers to discuss the issues and report to the larger class on the models of pedagogies that will be appropriate for upper primary learning</p> <p>Independent study (project): Provide for teachers, OERs and videos in of inclusive learners so they can obtain information on how they learn science https://www.youtube.com/watch?v=BWaatwkW_6g https://www.youtube.com/watch?v=ZbRMpkRJKpg https://www.youtube.com/watch?v=wBz6glO5x5Q</p>	<p>Face-to-face/e-learning opportunities/independent Study: Student teachers, working in mixed gender groups, view short videos provided by tutor, discuss and write a report to share with the larger group, on the models of pedagogies that will be appropriate for upper primary learning</p> <p>Each groups has 5 minutes to make presentation and get critiqued</p> <p>Independent study: Each student teacher is required to use the information from OERs to design a model of pedagogy that would be developmentally appropriate to teaching upper primary science</p>
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. By practicing with analogue and digital thermometers, student teachers' difficulties in manipulating/handling/measuring skills of body temperatures will be addressed.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment as and for learning: Reports and posters on how early adolescent learns Science. (20 marks), Student teachers doing short presentations (3-5 minutes each) on how to adolescent can be adapted to learn science. (30 marks) 			
Teaching Learning Resources	Training on reflections and nature walk			
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . 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.			

	<p>Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for senior high schools. Accra: Unimax MacMillan.</p> <p>Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.</p> <p>Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V., & Obeng-Ofori, D. (2011). <i>SWL integrated science for senior high schools: Students book</i>. Accra, Ghana; Sam-Woode Ltd.</p>
CPD Requirement	N/A

LESSON 11

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12		
Title of Lesson	Science Curriculum Studies- Co- planning and Co - Teaching			Lesson Duration	3 Hours		
Lesson description	Science learning at the basic school can be challenging to the learning especially the early adolescent. This lesson looks at how to identify and use challenging, hands-on pedagogies to co plan for co teaching in order to prepare the student teacher to adequately benefit from the STS experience at the upper primary level.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers have undertaken a lesson on science pedagogies that are developmentally appropriate and are on a project to develop inclusive pedagogies for science learning at the Upper Primary level..						
Possible barriers to learning in the lesson	Student teachers may: <ul style="list-style-type: none"> • Have misconceptions age appropriate learning • Imagine that the most pressing consideration for early adolescent mingling is from the awareness of the opposite sex and adolescent sexuality. 						
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face ✓	Practical Activity	Work-Based Learning	Seminars ✓	Independent Study ✓	e-learning opportunities ✓	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to Face: Discussion, Student groups interactions on concepts of age appropriate learning Independent Study: Inquiry and reflections e-learning opportunities: Use of internet, simulations and video presentations						
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Student teachers will adopt much positive outlook to deal with early adolescent crises and learning difficulties • Student teachers will be able to manage excesses from egos and other considerations for early adolescent collaborations. 						
<ul style="list-style-type: none"> • Learning Outcome for the lesson, picked and developed from the course specification • Learning indicators for each learning outcome 	Learning Outcomes	Learning Indicators		Identify which cross – cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed			
	<ul style="list-style-type: none"> • Co plan and co teach science lessons at the upper primary level. (NTS 2c, p.13 & 21), (NTS 2c, p.13 & 21), (NTS2b, p.12, 2c, p.13 & 21) 	<ul style="list-style-type: none"> • Produce science lesson plan and model teaching in micro teaching. 		Student teachers develop skills of communication, collaboration and mutual respect while appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion.			
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	
Science Curriculum Studies- Co- planning and Co - Teaching	Reviewing lesson 10	30 minutes	Face-to-face: Tutor introduces the lesson by reviewing Studentteachers' relevant previous knowledge on developmentally appropriate and inclusive pedagogies that			Face-to-face: Student teachers review their previous knowledge on developmentally appropriate and inclusive pedagogies can be used to	

			can be used to adapt science concepts to the primary school level using discussion and role play in mixed ability groups	adapt science concepts to the primary school level using discussion and role play in mixed ability groups. In doing so, they share their report from nature walk and reflections.
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	Co planning	90 minutes	Independent Study/e-learning: Put Students into groups (between 3 members to 5 members per group) and direct to select topics, apply the knowledge of developmentally appropriate and inclusive pedagogies, and plan lessons they will micro teach. Provide short videos to guide them. https://www.youtube.com/watch?v=wBz6glO5x5Q	Face-to-face: Student teachers working in groups co plan lessons they will micro teach for their peers to critique
	Co teaching	90 minutes	Face-to-face/Seminar: Tutor allows student teachers to do micro teaching in groups to demonstrate co-teaching for 10 minutes each Allow other groups to ask questions and make suggestions for improvement.	Face-to-face/Seminar: opportunities: Student teachers in groups do micro teaching in their groups to demonstrate co-teaching while the larger group make quick suggestions for improvements.
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. By practicing with analogue and digital thermometers, student-teachers' difficulties in manipulating/handling/measuring skills of body temperatures will be addressed.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> • Assessment: Micro teaching of Co planned lessons • 			
Teaching Learning Resources	Training on reflections and nature walk and inclusive science classrooms.			
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan; Handbook for PD Coordinators Themes 1- 10			
Additional Reading List	Abbey, T. K., & Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i> . Accra: Unimax Macmillan. Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers' chemistry for senior high schools</i> . 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). <i>SWL integrated science for senior high schools: Students book</i> . Accra, Ghana; Sam-Woode Ltd.			
CPD Requirement	Training for preparing checklist for identifying inclusivity and values for learning science Training on how to identify tolerance in group work			

LESSON 12

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Review and STS preparation 2				Lesson Duration	3 hours	
Lesson description	This lesson review student teachers learning of lessons 7 to lesson 11 against the CLOs for these lessons and discusses the expectations for STS. The lesson will enable student teachers to evaluate their own learning and guide them to the appropriate remedial processes for effective learning as well as appropriately prepare them for STS.						
Previous student teacher knowledge, prior learning (assumed)	Lessons learnt from lesson 8 through lesson 11 in all learning approaches and observations/experiences during STS.						
Possible barriers to learning in the lesson	Misconception to some concepts not adequately dealt with. Lessons not appropriately understood by student teachers.						
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face √	Practical Activity	Work-Based Learning	Seminars √	Independent Study √	e-learning opportunities √	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to-Face: Discussion, group work in same ability group works. Modelling, Concept Mapping and Cartooning. Independent Study: Tutor and student teacher reflections (individually and collectively) e-learning Opportunities: OERs and Video presentations Seminar: Presentations, Discussions and reflections of STS						
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Ascertain the level of understanding of concepts. Test various skills and cross – cutting issues Provide remedial tuition/tutorials on where necessary for experiences during STS Correct misconceptions and misinformation Build the necessary support going forward on SEN and Gender issue <p>NTS:</p> <p>1a) Critically and collectively reflect to improve teaching and learning 1c) Demonstrate effective growing leadership qualities in the classroom and wider school 1d) Is guided by legal and ethical teacher codes of conduct in his or her development as a professional teacher 2a) Demonstrates familiarity with the education system and key policies guiding it. 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. 2e) Understands how children develop and learn in diverse contexts and applies this in his or her teaching</p>						
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes	Learning Indicators			Identify which cross – cutting issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed		
	<ul style="list-style-type: none"> Identify weakness and strengths in learning the science lesson for the period under review 	<ul style="list-style-type: none"> Make a list of Weaknesses and strengths on poster papers for sharing 			Collaborations, Communication and Research: Through group work and presentation		
	<ul style="list-style-type: none"> Be able to reflect expectations for STS and on lessons learnt so far and state new insights and/or grey areas needing remedies 	<ul style="list-style-type: none"> Provide a reflection report on STS and demonstrations and illustrations on a given media of lessons learnt so far 			Equity and Reflection is developed from reflective activities		

	<ul style="list-style-type: none"> Correct misconception/misinformation for earlier (lesson 7– 11) lessons 	<ul style="list-style-type: none"> Present concept maps and/or models linking misconceptions/misinformation to new insights 	Creativity and critical thinking is developed in developing models and concept maps
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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	
			Teacher Activity	Student Activity
Topic Title			Facilitate and provides the necessary tool for students activities.	
Review and STS preparation 2	Reviewing the understanding of lessons 7 to 11 against the CLOS	60 minutes	Face-to-face: Tutor led brainstorming session with student teachers to unearth the weaknesses and strengths of student teachers in the lessons 7 – 11. Initiate discussion /Talk for learning approach using groupings (Same ability and then mixed groups) to identify student teachers’ strengths and weakness in the lessons learnt so far.	Face-to-face: Student teachers discuss their problems in the previous lessons and provide a checklist identifying and recording all possible weaknesses and strengths.
	Discussion and reflection of expectations for STS	90 minutes	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 STS.	Seminar:Student teachers listen to various presentations. Student teachers then discuss observations made during STS based on the National Teacher’s Standards, reflect and provide a checklist of lessons learned and problems identified and how they can be addressed. Student teachers then provide a reflection report on STS
	Remedies to course topics	30 minutes	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/misinformation to new insights.
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through mixed and same group work to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. Through modelling and group work, collaboration is established.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment as Learning: Student teachers’ presentations during group work and model work presentation helps to assess them of learning (25 marks) Assessment for and as learning: Student teachers working in groups on remedial tutoring helps to assess them for and as learning (10 marks) 			

Teaching Learning Resources	Cardboards, Course manual, Poster paper, Projectors,
Required Text (core)	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.
Additional Reading List	Abbey, T. K., &Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i> . Accra: Unimax Macmillan. Ameyibor, K., & Wiredu, M. B. (2006). <i>Ghana association of science teachers chemistry for senior high schools</i> . 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). <i>SWL integrated science for senior high schools: Students book</i> . Accra, Ghana; Sam-Woode Ltd.
CPD Requirement	Training on preparation of checklist and Reflection guides

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