

YEAR 2

SEMESTER 1

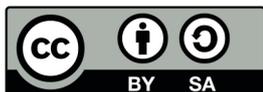
Four-Year B.Ed. Course Manual

ENVIRONMENTAL BIOLOGY





The Government of Ghana



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FOREWORD

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

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

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

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

Professor Mohammed Salifu Director General, Ghana Tertiary Education Commission

ACKNOWLEDGEMENTS

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

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

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

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

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

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

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

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INTRODUCTION TO COURSE MANUALS

Welcome to this B.Ed. Course manual.

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

The manuals serve the following purposes:

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

Specifically, they also:

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

Who are course manuals for:

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

USING THIS MANUAL

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

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

My teaching philosophy is

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

A. Course Information

ENVIRONMENTAL BIOLOGY

The vision for the New B.Ed. Curriculum

The vision is to transform initial teacher education and train highly qualified, motivated new teachers who are effective, engaging and fully prepared to teach the basic school curriculum. This would improve the learning outcomes and life chances of all learners they teach as set out in the National Teachers' Standards. In doing this it would instil in new teachers the Nation's core values of honesty, integrity, creativity and responsible citizenship and to achieve inclusive, equitable, high quality education for all learners

i. Course Details

Course Name	Environmental Biology				
Pre-requisite	Introduction to Integrated Science I and Introduction to Integrated Science II (from year 1)				
Course Level	200	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 uses the universal design for learning approach to extend the basic science concepts of the student teacher on the following content areas: Classification of plants and animals, flowering plants, fruits formation and dispersal, carbon and nitrogen cycle, farming systems, human body I and II, teaching ecosystems, teaching types of ecosystems and the science pedagogy and curriculum. This is done through appropriate pedagogies such as Nature walk, talk for learning approaches, demonstrations, concept mapping, problem-based teaching /learning, and video presentations as well as authentic 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. This course continues to emphasize on the essential attitudes and values (NTS, 1a-c) of professional science teaching such as honesty, carefulness and accuracy. The student teacher, in this course, should be introduced to issues of transition in terms of use of the English language as medium of instruction and characteristics and learning styles of early adolescent and Supported Teaching in School (STS) (NTS, 2e), as well as managing transition from to middle childhood (Upper Primary) to Early Adolescent (JHS). (NTS, 2e, p.13), (NTS, 1a-c, p. 12), (NTS, 2c, P. 13).

3. Key Contextual Factors

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

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

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

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

4. Core and transferable skills and cross cutting issues, including equity and inclusion	
Critical and Independent Thinking, Equity and Inclusivity, Social Collaboration/Team work, Creativity, Innovation, Problem solving, Manipulation, Reflection, developing scientific process skills and Inquiry.	
5. Course Learning Outcomes	6. Learning Indicators
CLO1: Explain the need for Junior High School students to learn about specific Biology concepts in the JHS(NTS 2c, p.13 & 21)	<ul style="list-style-type: none"> Produce reflective reports about links between Junior high school Biology future careers and lifelong learning.
CLO2: Develop creative learning activities that can make the JHS school learner distinguish between the concepts(NTS 2c, p.13 & 21)	<ul style="list-style-type: none"> Create charts, concept maps and mind maps about specific concepts
CLO3: Recognize that variation and diversity of concepts in biology and explain same to JHS learners(NTS 2c, p.13 & 21), (NTS 2c, p.13 & 21)	<ul style="list-style-type: none"> Present a mini project work on at least one concept.
CLO4: Develop and use developmentally appropriate TLMS from locally available materials for teaching JHS school (NTS 3j, pg. 14)	<ul style="list-style-type: none"> Prepare improvised, developmentally appropriate materials for teaching at the JHS school level
CLO5: Demonstrate an understanding of the principles of professional development observed during STS through reflective reporting. (NTS, 2c & 3e, Pg. 14 finger & 24)	<ul style="list-style-type: none"> Prepare a reflective report on observations during STS for a seminar
CLO6: Demonstrate knowledge and application of the Teachers' Standards, for JHS school curriculum, laws protecting children and all relevant regulations, and model positive values, attitudes and behaviours student teacher will be working towards meeting the NTS. (NTS 1b p14 & 18, 14)	<ul style="list-style-type: none"> Provide a checklist to identify the NTS values, attitudes and behaviours applicable to JHS teaching from the curriculum Prepare a list of some examples of professional needs qualities or traits/and some characteristics of professional teachers

7. Course Content			
Unit (Week)	Topic	Subtopic (if any)	Teaching and learning activity to achieve the learning outcomes
Week 1	Review of Year 1 integrated science	Recap of year 1 lessons and challenges thereof.	<ul style="list-style-type: none"> Demonstrations and discussions Reflections, presentations and designing Role playing/song creations Simulations, video and Computer presentation Produce charts and illustrations of forms and sources of energy
	Teaching Classification of Plants and Animals	<ul style="list-style-type: none"> Classification systems Divisions and classes of plants Phyla and classes of animals Classification of insects Reflections on classification of insects Reflection on the diversity of the classes 	
Week 2	Teaching Flowering Plants	<ul style="list-style-type: none"> Structure and function of flowers Photosynthesis Values 	<ul style="list-style-type: none"> Demonstrations and group discussions Reflections, presentations and designing/game development Concept mapping iv. Simulations, video and Computer presentation
Week 3	Teaching Fruit Formation and Dispersal	<ul style="list-style-type: none"> Fruit formation, Fruit and seed Dispersal Reflection on Professional Values 	<p>Face-to Face: Discussion, Role Playing, Construction of games, Designing rhymes, creating songs about plants and animals</p> <p>e-learning: Video and Computer simulation on teaching activities and assessment strategies.</p>
Week 4	Carbon and Nitrogen Cycle	<ul style="list-style-type: none"> Concepts (Phases of the cycles of Carbon and Nitrogen) Green House effect 	<p>Face-to-face: Mixed group discussions and demonstrations/role plays, Concept Mapping and Cartooning.</p> <p>e-learning/Reflections: Video</p>

		<ul style="list-style-type: none"> • How to teach the Nitrogen and Carbon Cycles 	presentations from MOOCs with reflections on values such as Honesty, Accuracy, Precision and critical thinking.
Week 5	Farming Systems	<ul style="list-style-type: none"> • Types of Farming Systems • Agricultural Use of Farming Systems • Teaching how to teach Farming Systems 	Face-to-face: Discussion, Talk for learning approaches with student teacher presentations, Independent Face-to-face: Discussion, Talk for learning approaches with student teacher presentations, Independent Study: problem-based teaching, e-learning opportunities: multimedia presentations, problem-based teaching, e-learning opportunities: multimedia presentations
Week 6	Course Review I and STS Seminar	<ul style="list-style-type: none"> • Reviewing and reflecting on lessons 1-5 • STS Seminar 	Face-to-Face: Pyramid discussions, Presentations e-learning: OERs and MOOCs Independent Study: reflection on observations made during STS and problem-based learning: on National Teacher's Standards
Week 7	Teaching about the Respiratory System	<ul style="list-style-type: none"> • Structure and function of the Respiratory and Digestive systems • Gaseous Exchange and Tissue Respiration • Teaching how to teach the Respiratory System 	Face-to-face: Discussion, Talk for learning approaches with student teacher presentations, Practical work. e-learning: OERs and MOOCs
Week 8	Teaching about the Digestive System	<ul style="list-style-type: none"> • Enzymes and Digestion • Dentition • Teaching how to teach the Digestive system 	Face-to-face discussions, demonstration, mixed group work Computer simulations and OERs sources
Week 9	Teaching the Ecosystem	<ul style="list-style-type: none"> • Concepts of the Ecosystem • Terminologies as used in Ecosystem • Dealing with Misconceptions about Ecosystem 	Independent Study: Inquiry and reflections Face-to-Face: Discussions, Role playing and Game e-learning: OERs and MOOCs with report writing
Week 10	Teaching types of Ecosystems	<ul style="list-style-type: none"> • Types of ecosystems • Misconceptions of Ecosystem • Teaching about the ecosystem 	Face-to-Face: Think, Pair, Share, Share discussions, Reflections e-learning: OERs and MOOCs with report writing
Week 11	Science Pedagogy and Curriculum	<ul style="list-style-type: none"> • Psychology of early Adolescent in Science teaching • Introduction to Science lesson plans and Resources • Micro teaching 	Face-to-Face: Modelling, Role playing and developing games. Seminar: Independent Study: Reflections and Inquiry

Week 12	Course Review II with STS seminar	<ul style="list-style-type: none"> • Reviewing and reflecting on lessons 7-11 • STS Seminar 	Face-to-face: Discussion, Talk for learning approaches with student teacher presentations, Independent Study: problem-based learning on National Teacher's Standards and reflection on observations made during STS.
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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)

- Selected Item of Student work (3 items – 10%) = 30%
- Midterm assessment – 20%
- Reflective Journal – 40%
- Organization of the Subject Portfolio- 10% (How its presented/organized)

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

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

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

Weighting: 40%

CLO3, CLO4, CLO5, CLO6

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) quizzes, multiple assignments, project works, group presentations, sample lesson plans, Charts, concept map and cartoon designs

Summary of Assessment Method: Practical Activities/Reflective Notes/ evidence of values learned/Group work/Evidence of equity and inclusivity/transferable skills during practical activities

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

Weighting: 30%

CLO1, CLO2, CLO3, CLO4

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

Component 3: Assessment as Learning (Review of Reports), quizzes, multiple assignments, project works, group presentations, sample lesson plans, Charts, concept map and cartoon designs

Summary of Assessment Method: Peer Review / Evidence of report from school visits for portfolio/Reflective notes

Core skills to be acquired: Pedagogical, observational and cooperative skills

Weighting: 30%

CLO 1 – CLO 6

9. Required Reading and Reference List

- Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). *Ghana association of science teachers integrated science for senior high schools*. Accra: Unimax MacMillan.
- Abbey, T. K., & Essiah, J.W. (1995). *Ghana association of science teachers physics for senior high schools*. Accra: Unimax Macmillan.
- Ameyibor, K., & Wiredu, M. B. (2006). *Ghana association of science teachers' chemistry for senior high schools*. Accra: Unimax MacMillan.
- Asabere-Ameyaw, A., & Oppong, E. K. (2013). *Integrated science for the basic school teacher I*. Winneba: IEDE.
- Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V. & Obeng-Ofori, D. (2011). *SWL integrated science for senior high schools: Students book*. Accra, Ghana; Sam-Woode Ltd.

10. Teaching and Learning resources

Copies of Course Manual for Y2 S1, 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

11. Course related professional development for tutors/ lecturers

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

Lesson 1

Year of B.Ed.	2	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 Classification of Plants and Animals				Lesson Duration	3 Hours	
Lesson description	<p>The lesson provides the student teacher the opportunity to deepen pedagogic knowledge of classification of plants and animals, aspects of which was taught at senior high school in integrated science. The studentteacher will extend knowledge of classification to understand the diversity in the science classroom which will lead to collaboration and tolerance with and respect to colleagues during science lessons.</p> <p>This first lesson introduces student teachers to the course learning outcomes and the three assessment components of the course</p>						
Previous student teacher knowledge, prior learning (assumed)	Studentteachers studied aspects of classification of plants and animals at the pre-tertiary level of education						
Possible barriers to learning in the lesson	Inadequate handling of the topic at the senior high level of education.						
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.	<p>Face-to-Face: Discussion, talk for learning approaches with multimedia presentations and simulations, practical activities, brainstorming, and reflective practice</p> <p>Practical Activity: Manipulation, recording.</p> <p>Seminar: STS seminars</p> <p>Independent Study: Inquiry and reflections</p> <p>e-learning opportunities: MOOCs, YouTube and internet source videos</p>						
<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"> The lesson is intended to help student teachers deepen their pedagogic knowledge on classification of plants and animals and extend this knowledge to classification of the diverse groups in the science classroom. The lesson would help the studentteacher to be able to develop classification keys for classification of divisions and phyla of plants and animals respectively and classes of these organisms. The lesson would equip the studentteacher with values such as tolerance, respect for colleagues and ability to work with others as they will come to understand and appreciate the diverse nature of the science classroom when they apply their knowledge of classification to the classroom situation. <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"> • Link concepts in year one to new concepts to classification of plants and animals • Student teachers should demonstrate ability to identify misconceptions/incorrect scientific about specified concepts. • The student teachers should demonstrate the skill to identify the various divisions/pyhla and classes of plants and animals • The studentteachers should reflect on diversity of the classroom relating classification to the diversity in the class. 	<ul style="list-style-type: none"> • Develop Concept Maps to link concepts from year 1 to new concepts yet to be developed • Student teachers submit a list of misconceptions /incorrect ideas of various concepts and their matching correct ideas • Student teachers s develop chart of at least one division or class that describe features used to sort organisms into a groups, e. g., class insects: three body parts, head thorax and abdomen • Studentteachers to present a report on the diversity in the classroom 	<p>Reflection, Communication and Research: Through construction of checklists on science concepts</p> <p>develop the skills of construction of chart, aesthetics and critical thinking through observation and identification</p> <p>Developing Social collaboration and attention and care to individual needs (SEN) through group work</p>	
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
Teaching Classification of Plants and Animals	Introduction to JHS year 2 course manual	20minutes	Face-to-Face: Tutor initiates showerthoughts discussion with student teachers to identify expectations for and introduce new course manual for specialism to student teachers	Face-to-Face: Student teachers respond to discussions, noting their expectations, drawing from their experience with year 1 course manuals and focusing on the specialism for JHS.
	Recap of Year 1 and the challenges thereof	20 minutes	Face-to-face/Group activity: Tutor initiates a Pyramid discussion on the year 1 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 one lessons, the challenges, unique values and produce a concept map of possible expectations in the content of the JHS science lessons
	Classification Systems	20 minutes	Face-to-face: Tutor to guide student teachers to brainstorm and reflect to identify misconceptions/incorrect ideas about taxonomy drawing examples from prior knowledge from SHS. Tutor may provide list from Taxonomic table to help student teachers reflect on their prior knowledge Tutor guides student teachers to name classification systems	Face-to-face/Group activity Student teachers present a checklist of misconceptions/incorrect ideas about taxonomy, concepts of plant and animal with their matching correct science concepts/ideas Student teachers to provide a list of classification systems
	Divisions and Classes of plants	40 minutes	Face-to-face:Tutor allows student teachers to pick different plants from their environment. Tutor provides student	Face-to-face/Group activity Student teachers in diverse groups collect different plants and develop classification keys

			teachers with classification keys, adequate samples of plant parts and guide them to develop their own classification keys and use that to identify, classify and name some of the plants in the school environment with	and provide a report/chart on identification, classification and naming of plants in the school environment
	Phyla and classes of animals and (insects)	30 minutes	Face-to-face:Tutor to design practical activities on classification of animals observed in their environment. Tutor to provide student teachers with specimen of animal species, pictures of different kind of animals with accompanying classification keys	Face-to-face/Group activity Student teachers in diverse ability groups sort out animals into phyla and classes based on the physical features of the animals and present a chart on the classification with explanation.
	Classification of insects	30 minutes	Face-to-face:Tutor to present Video on features of insect class to student teachers	Face-to-face/Group activity Student teachers in diverse/inclusive groups observe and provide a list of different classes of insects with notes on the basis of their classification.
	Reflection on diversity in the class	20 minutes	Face-to-face:Tutor to guide studentteachers to use their knowledge on classification of plants and animals to reflect on the diversity relating classification to the in the classroom (in terms of se, colour, ethnicity, culture and ability levels	Face -to-face: Studentteachers to present a report on their reflection on the diversity of the class
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 for Learning: Student teachers to provide a checklist of misconceptions/incorrect ideas about taxonomy with their matching correct science concepts/correct ideas, student teachers in groups present reflections on diversity of the classroom as an extension of their knowledge on classification of plants and animals Assessment as learning: studentteacher present group-developed checklist of keys for classification of division/phyla of plants and animals respectively and classes of these organisms. 			
Teaching Learning Resources	The Course Manual, collection of some specimens of plant parts and species of animals including insects, videos and computer stimulation on classification, classification keys, written practical activities on classification of plants and animals, projectors, Flip Charts, Pens, Pencils, 'A' 4 sheets, markers			
Required Text (core)	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>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 classification keys, skills for construction of checklist, and how to design practical 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.	2	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 Flowering Plants				Lesson Duration	3 Hours	
Lesson description	The lesson provides the studentteacher the opportunity to embed the teaching of the structure and functions of the flower and the phases of photosynthesis and to identify and correct misconceptions/incorrect ideas about photosynthesis, aspects of which were taught at senior high school in integrated science.						
Previous student teacher knowledge, prior learning (assumed)	Studentteachers studied aspects of structure and functions of the flower and photosynthesis and conditions necessary for photosynthesis to take place in plants at pre-tertiary level of education						
Possible barriers to learning in the lesson	Inadequate pedagogic skills in handling of structure and function of flowers and photosynthesis at the senior high level of education						
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.	Group discussion, talk for learning approaches with video/computer animations /simulations/ jigsaw puzzles, practical activities including drawing of flower, concept mapping, showerthoughts						
<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"> The lesson would help tutor studentteachers deepen their pedagogic knowledge on structure and functions of flowers and the stages of photosynthesis. The lesson would help the studentteacher to be able to develop practical skills in organising practical activities to investigate the floral parts, process of pollination and fertilisation leading to fruit formation. The lesson would help the studentteachers to deepen their knowledge of the stages of photosynthesis which they studied at the senior high school level. The studentteacher through the lesson would reflect on professional values such as carefulness, patience, tolerance and accuracy <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.</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 should demonstrate the understanding of structure and functions of flowers. The student teachers should demonstrate the ability to use concept mapping to show the phases of photosynthesis The student teacher through the lesson should reflect on 	<ul style="list-style-type: none"> Student teacher submit description of the flower as a reproductive unit of flowering plants and description and functions of parts of the flower Student teacher designs a concept map on phases of photosynthesis Student teachers to present a checklist on 	Reflection, Communication and Research: Through practical work to study the flower develop the skills of construction of concept maps, aesthetics and critical thinking through observation and identification Developing Social collaboration and attention and care to individual needs (SEN) through group work				

	professional values such as carefulness, patience, tolerance and accuracy	professional values such as carefulness, patience, tolerance and accuracy		
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
Teaching Flowering Plants	Structure and function of flowers	60 minutes	<p>Face-to-face: Tutor guides studentteachers through Showerthoughts to discuss the functions of the flower and its parts drawing experience from pretertiary concepts. Tutor provides enough flowers to studentteachers for practical activities: to describe parts of the flowers and their functions; to observe and describe arrangement of the floral whorls in transverse sections of flower buds; and to observe and describe the ovules and their arrangement on the placenta</p>	<p>Face-to-face: Student teachers to present T-charts on parts of the flower and their corresponding functions; a classification of the parts of the flower into reproductive and vegetative units and their functions</p>
	Photosynthesis	60 minutes	<p>Face-to-face/Group activity: Tutor guides studentteachers, working in mixed ability groups to identify and discuss misconceptions/incorrect ideas about photosynthesis school environment with</p>	<p>Face-to-face/Group activity: Student teachers in diverse groups present a checklist of misconceptions/incorrect ideas about photosynthesis with the correct science concepts</p>
	Values	60 minutes	<p>Face-to-face: Tutor to present jigsaw problems on phases of photosynthesis to studentteachers to solve. Tutor to provide concepts of phases of photosynthesis (chloroplast, energy capturing reactions and synthesis reactions) to construct concept maps</p>	<p>Face-to-face/Group activity: Studentteachers in mixed ability groups present report on solution of jigsaw puzzles and concept maps of concepts of the phases of photosynthesis</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. 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 a checklist of misconceptions/incorrect ideas about photosynthesis with their matching correct science concepts/correct ideas, student teachers in groups present concept maps on the concepts of the phases of photosynthesis (energy capturing phase and synthesis reaction phase). Assessment as learning: studentteacher present group-developed T-charts on parts of the flower and their functions 			
Teaching Learning Resources	The Course Manual, collection of flowers of various plants, scarpels/razor blades, pins, hand lenses/microscopes, jigsaw puzzles on photosynthesis, written practical activities on investigation of floral parts, Flip Charts, Pens, Pencils, 'A' 4 sheets, markers			
Required Text (core)	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.			

	<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 jigsaw puzzles, concept mapping techniques, classification keys, skills for construction of checklist, and how to design practical activities for specific grade levels

Lesson 3

Year of B.Ed.	2	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 Fruit Formation and Dispersal				Lesson Duration	3 Hours	
Lesson description	The lesson provides the studentteacher the opportunity to deepen knowledge of fruit formation and dispersal of fruits and seeds.						
Previous student teacher knowledge, prior learning (assumed)	Studentteachers studied aspects of fruit formation and dispersal of fruits and seeds. They are also aware of flowering plants within their environment						
Possible barriers to learning in the lesson	Inadequate pedagogic skills in handling of fruit formation and dispersal of fruits and seeds, mostly taught without practical activities						
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.	Group discussion, Talk for learning approaches with video/computer animations /simulations/ jigsaw puzzles, practical activities, showerthoughts, and reflective practice						
<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"> The lesson would help tutor student teachers deepen their knowledge on fruit formation and dispersal of fruits and seeds. The lesson would help the studentteacher to be able to develop practical skills in organising practical activities to investigate process of pollination and fertilisation leading to fruit formation. The lesson would help the studentteachers to deepen their knowledge on dispersal of seeds and adaptation of seeds and fruits to their mode/means of dispersal (by wind, water, hooks and spines, explosive mechanism <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.</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 should demonstrate the understanding of pollination, fertilization and fruit formation. Student teachers should demonstrate the ability to use concept mapping to show dispersal of fruits and seeds The student teacher through the lesson should reflect on professional values such as carefulness, 	<ul style="list-style-type: none"> Student teachers submit report on pollination, fertilisation and fruit formation in flowering plants Student teacher designed concept maps on features or adaptation of fruits and seeds that favour particular modes/means of dispersals Student teachers present a checklist on 	<ul style="list-style-type: none"> Reflection, Communication and Research: Through practical work to study pollination, fertilization and fruit formation develop the skills of construction of concept maps, aesthetics and critical thinking through observation and identification Developing Social collaboration and attention and care to individual needs (SEN) through group work 				

	patience, tolerance and accuracy		professional values such as carefulness, patience, tolerance and accuracy	
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
Teaching Fruit formation and Seed Dispersal	Recap of lesson 2	20 minutes	Face-to-face: Tutor allows student teachers to work in mixed ability groups to reflect on the previous lesson and list discuss any areas of difficulty	Face-to-face/Group activity: Student teachers work in mixed ability groups to reflect on previous lesson and list areas that need further clarification for discussion with tutor
	Fruit formation	50 minutes	Face-to-face: Tutor allows student teachers to watch video/computer animation on pollination, fertilization and fruit formation to student-teachers Tutor provides practical activities for student-teachers to investigate fertilization in flowers	Face-to-face: Student teachers to present report on observation of videos/computer animation on pollination, fertilisation and fruit formation; student-teachers, present evidence of practical activities.
	Dispersal of fruits and seeds	70 minutes	Face-to-face: Tutor to provide different fruits and seeds for student teachers to examine and identify modes of dispersal and the features that favour modes of dispersal	Face-to-face/Group activity: Student teachers in diverse groups present charts with explanation to show how various seeds and fruits are dispersed and the features that favour modes of dispersal
	Reflection on professional values	40 minutes	Face-to-face: Tutor to guide student teachers to identify professional values such as carefulness, patience, tolerance and accuracy as they reflect on the activities involved in the lesson	Face-to-face: Student-teachers to present checklist on professional values
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 for Learning: Student teachers to provide samples of drawings of T/S of flower buds, L/S of ovaries of flowers, student teachers in groups provide charts on modes of dispersal of fruits and seeds based on the latter's features. Assessment as learning: student teachers present reports from observation of videos on pollination and fertilisation of flowers 			
Teaching Learning Resources	The Course Manual, computer animation/video on pollination and fertilization, collection of different flowers that have undergone pollination and pollination, different kinds of fruits and seeds that are dispersed by different dispersal agents, flip-charts, Pens, Pencils, 'A' 4 sheets, markers			
Required Text (core)	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.			

	<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 charts, skills development for construction of checklist, and how to design practical activities for specific grade levels, techniques of reflective practice

Lesson 1

Year of B.Ed.	2	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12		
Title of Lesson	Teaching Carbon and Nitrogen Cycle			Lesson Duration	3 Hours		
Lesson description	The lesson is intended to student teachers pedagogic content knowledge of the phases of the cycles in Nitrogen and Carbon IV Oxide. It examines the process that make up the cycle, the relevance of the processes in making Nitrogen and carbon available to the ecosystem and how these processes can be made simple and meaningful to the learner.						
Previous student teacher knowledge, prior learning (assumed)	Studentteachers are conversant with the molecules, Nitrogen and Carbon						
Possible barriers to learning in the lesson	Studentteachers may: <ul style="list-style-type: none"> • have difficulty appreciating the cycle of Nitrogen and Carbon availability to the ecosystems • not have the skills in teaching the cycles of the Nitrogen and Carbon 						
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, lecturrettes 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"> • Proper scientific explanation of the cycles of carbon and Nitrogen • Demonstrate the skill and knowledge to teach the subject matter 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. 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.						
<ul style="list-style-type: none"> • Learning Outcome for the lesson, picked and developed from the course specification • Learning 	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"> • Demonstrate the understanding of processes in the nitrogen and carbon cycle. 	<ul style="list-style-type: none"> • Provide concept maps on the processes in the cycles • Draw a chart to show the nitrogen and carbon cycles 	Proper interpretation of scientific concepts of the Nitrogen and Carbon cycles, Studentteachers develop skills of communication, collaboration and mutual respect while appreciating individual				

indicators for each learning outcome	<ul style="list-style-type: none"> Explain the Nitrogen and Carbon cycle Demonstrate an ability to teach basic school science concepts of the nitrogen and carbon cycle. 	<ul style="list-style-type: none"> Group presentations/peer group teaching on the nitrogen and carbon cycles 	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
Teaching Carbon and Nitrogen Cycle	Concepts (Phases of the cycles of Nitrogen and Carbon)	60 minutes	<p>Face-to-face: Tutor introduces the lesson by reviewing Studentteachers' concepts on the uses of Nitrogen and Carbon IV Oxide.</p> <p>Face-to-face/Group activity: In mixed groups (gender-based) of 3 members, studentteachers discuss the process of keeping and fixing nitrogen in the soil from the atmosphere and maintaining Carbon IV Oxide in the atmosphere.</p>	<p>Face-to-face: Studentteachers discuss the concepts of Nitrogen and carbon IV oxide as useful molecules for plants and animals.</p> <p>Face-to-face/Group activity: Studentteachers discuss the process of keeping and fixing nitrogen in the soil from the atmosphere and maintaining Carbon IV Oxide in the atmosphere. Studentteachers illustrate their discussions on a chart showing the processes</p>
	Green House effect	60 minutes	<p>Face-to-face/e-learning opportunities: Guide student teachers to use OERs and videos of the greenhouse effect and allow student-teachers to brainstorm (in groups of 5 members of mixed intellectual ability) to come out with the causes and effects of the greenhouse effect. https://study.com/academy/lesson/what-is-greenhouse-gas-definition-causes-effects.html</p>	<p>Face-to-face/e-learning opportunities: Studentteachers use the OER and videos as basis to brainstorm (in groups of 5 members of mixed intellectual ability) to come out with the causes and effects of the greenhouse effect. Student-teachers produce concept map of processes in the cycles https://study.com/academy/lesson/what-is-greenhouse-gas-definition-causes-effects.html</p>
	How to teach the Nitrogen and Carbon cycles	90 minutes	<p>Face-to-face/E-learning opportunities: Tutor allows studentteachers to do short power point/poster presentation on how to teach the Nitrogen and Carbon Cycles to the Basic school learner (Mixed intellectual ability Groups of 3 members).</p>	<p>Face-to-face/E-learning opportunities: Studentteachers in groups do power point/poster presentation on how to teach the Nitrogen and Carbon Cycles the Basic school learner. (each group presents in 10 mins)</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.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> • Assessment for Learning: Samples of exercises on how studentteachers describe/explain Processes in cycles • Assessment as Learning: Groups of student teachers doing short presentations on how to teach carbon and Nitrogen cycles to the Basic School Learner (Reflection on presentations), Charts produced by studentteachers on the nitrogen and carbon cycles.
Teaching Learning Resources	Pen, paper, manila cards for charts and concept maps. YouTube videos on greenhouse effects and causes e.g., https://study.com/academy/lesson/what-is-greenhouse-gas-definition-causes-effects.html
Required Text (core)	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	Practicing to draw concept maps in cycles

Lesson 5

Year of B.Ed.	2	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 Farming Systems		Lesson Duration			3 Hours	
Lesson description	Lesson 5 is intended to give student teachers the skills and knowledge of teaching farming systems. It examines the process that makes up the cycle and how these processes can be made simple and meaningful to the learners at the Junior High Schools.						
Previous student teacher knowledge, prior learning (assumed)	Studentteachers have heard of and seen farms in their environments. They are also familiar with agricultural products.						
Possible barriers to learning in the lesson	Student-teachers may not be actively involved in farming at home and therefore may be ignorant about some farming practices						
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, Seminar: PowerPoint/Poster/Video presentations Independent Study: Inquiry and reflections e-learning opportunities: OERs 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"> Identifying appropriate farming systems for local communities Demonstrate the skill and knowledge to teach the subject matter <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. 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.</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"> Distinguish between the various farming systems based on environment and land size. Explain the uses of the various common types of farming systems. Demonstrate some teaching skills in teaching the concept of Farming systems and their uses 	<ul style="list-style-type: none"> Charts on Various types of farming systems in their home locality Reports on uses of faming types Presentations- Poster/power point/video –on teaching farming systems and their uses 	Studentteachers 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
Teaching Farming Systems	Types of Farming systems	50 minutes	<p>Face-to-face/e-learning opportunities: Tutor introduces the lesson with some videos or projections from OERs on farming systems for student teachers to identify and labels. For example: https://www.youtube.com/watch?v=vZFiHB0DO8o</p> <p>Face-to-face/Group activity: In groups (gender-based) of 6 members, studentteachers discuss types of farming systems. (Guide Studentteachers to single out possible misconceptions (e.g.farming is for males only)</p>	<p>Face-to-face/ e-learning opportunities: Studentteachers view materials from OERs/Video and attempt to identify and label based on familiarity. E.g. https://www.youtube.com/watch?v=vZFiHB0DO8o</p> <p>Face-to-face/Group Activity: Studentteachers discuss the observed farming systems and relate them to their environment and home.</p>
	Agricultural uses of farming systems	60 minutes	<p>Independent Study/Face-to-face/Group Activity:Tutor allows studentteachers to reflect on their environment and the farming systems used within their home and communities for about 20 minutes.</p> <p>Allow them discuss (in groups of 5 members of mixed gender) to come out with the uses of Farming Systems.</p>	<p>Independent study/Face-to-face/Group Activity: Studentteachers do individual reflections on their home environments, guided by a checklist, and note down the various uses of farming systems.</p> <p>Studentteachers, in groups of 5 members each, then discuss to come out with the uses of farming systems</p>
	Teaching how to teach Farming Systems	70 minutes	<p>Face-to-face/E-learning opportunities: Tutor allows studentteachers to do short power point/poster presentation on how to teach Farming systems and their uses.</p>	<p>Face-to-face/E-learning opportunities: Discussactivities to use and prepare a 20-minute activity to teach farming systems and their uses in groups using PowerPoint/poster or video simulations.</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.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment for Learning: Concept cartoons on uses of faming systems, Samples of exercises on types of farming systems Assessment as Learning: Student-Teachers doing short presentations (20 minutes each) on how to teach faming systems (Reflection on presentations). 			

Teaching Learning Resources	Pen, paper, manila cards for charts. YouTube videos on Farming Systems and use, e.g., https://www.youtube.com/watch?v=vZFiHB0DO8o
Required Text (core)	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 on how to identify useful online electronic resources for teaching (Searching the internet on any device)

Lesson 6

Year of B.Ed.	2	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	Course Review 1 and STS Seminar					Lesson Duration	3 Hours
Lesson description	The review the Supported Teaching in Schools (STS) and audit the lessons for the first half of the semester. It is also expected that Student teachers will reflect during this lesson on their own progress in the course so far.						
Previous student teacher knowledge, prior learning (assumed)	Experiences and observations during STS and lessons learnt from lesson 1 through lesson 5 in all learning approaches.						
Possible barriers to learning in the lesson	Misconception to some concepts not adequately dealt with. Lessons not appropriately understood by student teachers and challenges during STS.						
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, Same ability, mixed ability and gender-based group works. Practical Activity: Modelling, Concept Mapping and Cartooning, manipulations. Independent Study: Tutor and student-teacher reflections (individually and collectively) and inquiry e-learning Opportunities: OERs 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"> Ascertain the level of understanding of concepts. Test various skills and cross – cutting issues Provide remedial tuition/tutorials 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</p> <p>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</p>						
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification 	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"> • Learning indicators for each learning outcome 	<ul style="list-style-type: none"> • Identify weakness and strengths in learning the science lesson for the period under review • Be able to reflect on lessons learnt during STS and state new insights and/or grey areas needing remedies • Correct misconception/misinformation for earlier (lesson 1 – 5) lessons 	<ul style="list-style-type: none"> • Make a list of Weaknesses and strengths on poster papers for sharing Provide a reflection report and answer questions on topics learnt so far through demonstrations and illustrations on a given media • Provide a reflection report on STS and demonstrations and illustrations on a given media of lessons learnt so far • Present concept maps and/or models linking misconceptions/misinformation to new insights 	<p>Collaborations, Communication and Research: Through group work and presentation Equity and Reflection is developed from reflective activities Creativity and critical thinking are developed in developing models and concept maps</p>	
<p>Content of lesson picked and developed from the course specification</p>	<p>Sub Topic</p>	<p>Time or Stage</p>	<p>Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study</p>	
<p>Topic Title Course Review 1 and STS seminar</p>	<p>Reviewing the understanding of the lessons: Classification of Plants and Animals, Flowering Plants, Fruit formation and Seed Dispersal, Carbon and Nitrogen Cycle and Farming Systems.</p> <p>Discussions and observations during STS</p>	<p>60 minutes</p> <p>90minutes</p>	<p>Teacher Activity</p> <p>Face-to-face: Tutor led brainstorming with studentteachers to unearth weaknesses and strengths of student teachers for lessons 1-5. 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. The groups are provided with checklist on each topic so that they are able to list weakness and strengths.</p> <p>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.</p>	<p>Student Activity</p> <p>Face-to-face/Group Activity: Student teaches review, reflect and brainstorm on lessons 1-5 and provide a checklist identifying and recording all possible weaknesses and strengths. Working in groups and with the checklist studentteachers identify and record all possible weaknesses and strengths in the lessons learnt so far.</p> <p>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</p>
	<p>Remedies to course topics</p>	<p>30 minutes</p>	<p>Face-to-face/Group Activity:Group student teachers according to remedy need and provide specific task assistance in the areas on concept needing remedy.</p>	<p>Face-to-face/Group Activity:Students teachers work in the special groups (Same remedy need group) on tasks to remedy their learning need.</p>

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 group work and presentations, collaboration is established.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Assessment of Learning: Student teachers’ presentations during group work and model work presentation helps to assess them of learning Assessment for and as learning: Student teachers working in groups on remedial tutoring helps to assess them for and as learning
Teaching Learning Resources	Cardboards, Course manual, Poster paper
Required Text (core)	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

Lesson 7

Year of B.Ed.	2	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 Respiratory System				Lesson Duration	3 Hours	
Lesson description	Lesson 7 describes the respiratory processes and emphasizes on the teaching skills obtained for teaching specific science lesson.						
Previous student teacher knowledge, prior learning (assumed)	Studentteachers are conversant with the molecules, Nitrogen and Carbon						
Possible barriers to learning in the lesson	Possible misconceptions and wrong views that student teachers may have about the respiratory and digestive systems. Also, student teachers may have been introduced to the topic from theoretical point.						
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, Brainstorming Practical Activity: Practical manipulation and demonstration of breathing 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"> Identify the primary function of the lungs and digestive tracts Demonstrate the skill and knowledge to teach the subject matter <p>NTS: Teacher; 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</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"> Demonstrate an understanding of the structure and primary function of the respiratory and digestive system Acquire the skill necessary for teaching the topic 	<ul style="list-style-type: none"> Concept cartoons that describes the structure and function of the respiratory and digestive systems Designed activities to teach the subject matter 	Studentteachers 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 on the structure and function of the respiratory and digestive system.				
Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study				
			Teacher Activity		Student Activity		
Teaching Respiratory System	Structure and function of the Respiratory System	20 minutes	Face-to-face/e-learning opportunities: Tutor introduces the lesson by projecting videos and		Face-to-face/ e-learning opportunities: Studentteachers watch videos and animations on		

		30 minutes	<p>animations of breathing and movement of food through the digestive system for Studentteachers to observe, brainstorm and comment.</p> <p>https://www.youtube.com/watch?v=5JrON_sm5gc https://www.youtube.com/watch?v=08VyJOEcDos</p> <p>Face-to-face/Group Activity/e-learning opportunities: Group studentteachers into groups (mixed intelligence) of 5-members each and provide for them videos, OERs and pictures of the structures and animations of the processes in the respiratory and digestives systems for studentteachers to observe, discuss and report on the functions</p>	<p>breathing and movement of food in the digestive tract and make comments. They link the breathing process with the CPR process to explain the process better.</p> <p>Face-to-face/ Group Activity/e-learning opportunities: In mixed groups (mixed intelligence) of 5 members, studentteachers discuss the structure of the Respiratory system and the digestive system using Videos, OERs and Picture diagrams provided by teacher and write-up the functions of the structures they observe for reporting.</p>
	Gaseous exchange and tissue respiration	70 minutes	<p>Face-to-face/Independent Study:Tutor allows studentteachers to brainstorm (in their groups) and discuss gaseous exchange and tissue respiration from Computer simulations/or video sources. Allows student teachers to reflect on the processes discussed and develop concept cartoons on the tissue respiration and gaseous exchange</p>	<p>Face-to-face Independent Study: Studentteachers brainstorm and discuss tissue respiration and gaseous exchange They later reflect and develop concept cartoons for the processes for collection in the portfolio. Student teachers develop activities, using the concept cartoons that will be used to teach the basic schools.</p>
	Teaching how to teach Respiratory System	60 minutes	<p>Face-to-face/E-learning opportunities:Tutor leads studentteachers to teach the concepts, respiration and digestion using the concept cartoons and activities developed in peer teaching.</p>	<p>Face-to-face/Group Activity/E-learning opportunities: Studentteachers in groups teach the concepts, respiration and digestion using the concept cartoons and activities developed in peer 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.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment for learning: Reports from group work, will be used to assess students as learning Assessment as learning: Concept cartoons produced by studentteachers on tissue respiration and gaseous exchange will be used to assess student for learning. 			
Teaching Learning Resources	OERs, Videos of Respiration, tissues respiration, gaseous exchange and digestion. YouTube videos on respiration and movement of food through the digestive system: https://www.youtube.com/watch?v=5JrON_sm5gc https://www.youtube.com/watch?v=08VyJOEcDos			
Required Text (core)	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 grouping students into mixed ability, mixed intellectual and gender based

Lesson 8

Year of B.Ed.	2	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 the Digestive System				Lesson Duration	3 Hours	
Lesson description	The lesson is intended to give studentteachers an understanding of what enzymes are, that is, substances that are produced by a living organism which act as a catalyst to bring about a specific biochemical reaction. The lesson further examines the part that enzymes play in the digestion process. The concept of dentition, i.e., the arrangement or condition of the teeth in a particular species or individual, is also introduced.						
Previous student teacher knowledge, prior learning (assumed)	Studentteachers have experienced the process of digestion, the existence and use of their teeth						
Possible barriers to learning in the lesson	Possible misconceptions about how food is digested and the arrangement of the teeth						
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 Practical Activities: Group work and designing Independent Study: Reflections e-learning Opportunities: Simulations, video presentations						
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. • Write in full aspects of the NTS addressed	<ul style="list-style-type: none"> • Get the conceptual understanding of what enzymes are. • Appreciate the role that enzymes play in the digestion of food. • Understand the formation of teeth • Discard the common misconceptions that studentteachers have about enzymes, digestion and dentition • Designing activities to teach the subject matter <p>NTS, Teacher;</p> <p>2a) Demonstrates familiarity with the education system and key policies guiding it.</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</p> <p>3i) Explains concepts clearly using examples familiar to students.</p> <p>3m) Identifies and remediates learners’ difficulties or misconceptions, referring learners whose needs lie outside the competency of the teacher.</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"> • Define and explain what enzymes are and the role that they play in the digestion process • Demonstrate knowledge of the concept of dentition • Erase misconceptions about enzymes, digestion and dentition 	<ul style="list-style-type: none"> • Studentteachers define and explain what enzymes are (substances that are produced by a living organism which act as a catalyst to bring about a specific biochemical reaction). • Studentteachers demonstrate how enzymes influence digestion. 	<p>Through discussions and sharing of ideas in class studentteachers 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.</p>				

	<ul style="list-style-type: none"> Demonstrate knowledge and skill to teach topic enzymes, digestion and dentition. 	<ul style="list-style-type: none"> Studentteachers demonstrate the formation and the arrangement or condition of the teeth in a particular species or individual (dentition) Studentteachers produce chats showing the dentition of different species. 		
Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
Teaching the Digestive System	Enzymes and digestion	90 Minutes	Face-to-face/Group activity: Put studentteachers into different ability group activities to discuss what enzymes are and the role that they play in the digestion process (provide appropriate resources/materials to ensure that all students participate fully)	Face-to-face/Group activity: Studentteachers engage in talk for learning/ discussions on enzymes and digestions. Watch videos on enzymes and digestion. Groups make 5-minutes presentations of their findings to the class who observe, ask questions and at the end write a one-page report. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Dentition	60 Minutes	Face-to-face/Group activity: Tutor puts student-teachers into mixed ability groups to discuss dentition (provide appropriate resources/materials to ensure that all students participate fully)	Face-to-face/Group activity: Student-teachers discuss dentition and make models of types of dentition. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Teaching enzymes, digestion and dentition	30 Minutes	Face-to-face/Group activity: Select three random groups to make presentations on the day's lesson	Face-to-face/Group activity: Three volunteering groups to make 10 minutes presentations on enzymes, digestion and dentition.
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: studentteachers write a short examination on enzymes, digestion and dentition Assessment as learning: studentteachers make presentations on enzymes and the role they play in the digestion process Assessment for learning: student-teachers peer review presentations/chats and report. 			

Teaching Learning Resources	Projectors, Computers with internet access, Plants and animal Models, Online educational resources such as massive online open resources (MOOCs), YouTubes, khan academy https://www.youtube.com/watch?v=WbXmJXBt-Vk https://www.youtube.com/watch?v=QaN00b1WSGg
Required Text (core)	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 effective use of online learning resources

Lesson 9

Year of B.Ed.	2	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 the Ecosystem				Lesson Duration	3 Hours	
Lesson description	The lesson is intended to give student teachers an understanding of the concepts, misconceptions and terminologies as used in ecosystem (a biological community of interacting organisms and their physical environment.)						
Previous student teacher knowledge, prior learning (assumed)	Student teachers have lived experiences about the ecosystem within their environments, both at school and at home.						
Possible barriers to learning in the lesson	Possible misconceptions and incorrect ideas about the ecosystem. For example, that an ecosystem comprises of only living things.						
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 Practical Activities: Group work and designing Independent Study: Reflections e-learning Opportunities: Simulations, video presentations						
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. • Write in full aspects of the NTS addressed	<ul style="list-style-type: none"> • Get the conceptual understanding of ecosystems. • Understand the different terminologies associated with ecosystems • Discard the common misconceptions/incorrect ideas that student-teachers have about ecosystems • Designing activities to teach at least four types of ecosystems <p>NTS, Teacher;</p> <p>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 3i) Explains concepts clearly using examples familiar to students. 3m) Identifies and remediates learners’ difficulties or misconceptions, referring learners whose needs lie outside the competency of the teacher.</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"> • Define and explain what ecosystems are <ul style="list-style-type: none"> ✓ Demonstrate knowledge of the concept of the ecosystem and the different terminologies associated with it ✓ Erase misconceptions and incorrect ideas about the 		<ul style="list-style-type: none"> • Studentteachers define and explain what an ecosystem is and produce charts of at least four types of ecosystems. • Studentteachers demonstrate understanding of the different terminologies associated with an ecosystem. • Designed lesson plans as evidence of ability to 		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.		

	ecosystem ✓ Demonstrate knowledge and skill to teach ecosystem	teach ecosystem	
Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study
			Teacher Activity
			Student Activity
Teaching Ecosystems	Concepts of ecosystems	90 minutes	<p>Face-to-face/Group activity: Put studentteachers into different ability groups to discuss what an ecosystem is that is, a biological community of interacting organisms and their physical environment. Tutor provides appropriate resources/materials to ensure that all students participate fully.</p>
	Terminologies as used in ecosystems	60 minutes	<p>Face-to-face/Group activity: Tutor puts studentteachers into mixed ability groups to discuss different terminologies associated with ecosystems and talk of important ecosystem terminologies such as abiotic: physical, or nonliving, factors that shape an ecosystem. Examples include rocks, climate, pressure, soils, precipitation, sunlight, winds and humidity.</p>
	Dealing with misconceptions about ecosystems	30 minutes	<p>Face-to-face/Group activity: Put studentteachers into groups to engage in discussions to identify misconceptions/incorrect ideas about the ecosystem.</p>
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: studentteachers write a short essay on ecosystems and discuss at least four types of ecosystems. Assessment as learning: studentteachers make presentations on Misconceptions and wrong ideas and peer review presentations/chats and reports on ecosystems. 		
Teaching Learning Resources	Projectors, Computers with internet access, Plants and animal Models, Online educational resources such as massive online open resources (MOOCs), YouTubes, khan https://www.youtube.com/watch?v=JPHqUxxyLsY https://www.khanacademy.org/science/high-school-biology/hs-ecology/hs-introduction-to-ecology/v/ecosystems-and-biomes		

Required Text (core)	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 effective use of online learning resources

Lesson 10

Year of B.Ed.	2	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 Types of ecosystems				Lesson Duration	3 Hours	
Lesson description	The lesson is intended to further consolidate knowledge and understanding that student teachers gained in the study of Ecosystems I and associated terminologies by examining the different types of ecosystems. The lesson goes further to inculcate in studentteachers the knowledge and skills to teach ecosystems.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers have experiences about different types of ecosystem within their environments, both at school and at home.						
Possible barriers to learning in the lesson	Possible misconceptions and incorrect ideas about the ecosystem. For example, that an ecosystem comprises of only living things.						
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 Practical Activities: Group work and designing Work-based learning Independent Study: Reflections e-learning Opportunities: Simulations, video presentations						
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. <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 the types of ecosystems. Acquire the knowledge and skills to teach at least four types of ecosystem. Discard further misconceptions/incorrect ideas that student-teachers may have about ecosystems Designing activities to teach at least four types of ecosystems NTS, 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 3i) Explains concepts clearly using examples familiar to students. 3m) Identifies and remediates learners’ difficulties or misconceptions, referring learners whose needs lie outside the competency of the teacher.						
<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 at least four types ecosystems <ul style="list-style-type: none"> ✓ Demonstrate knowledge and skills to teach ecosystems ✓ Erase misconception s and incorrect ideas about the ecosystem 	<ul style="list-style-type: none"> Student teachers define and explain different types of ecosystems and prepare a report on at least four types. Student teachers produce chats showing. different types of ecosystems. Prepare short lessons (at most 10 minutes) to teach any of the types of ecosystems. 		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
Teaching types of Ecosystems	Types of ecosystems	90 minutes	Face-to-face/Group activity: Put student teachers into different ability groups to discuss the types of ecosystems (the eight major ecosystems: temperate forest, tropical rain forests, deserts, grasslands, the taiga, the tundra, the chaparral and the oceanic marine). (Provide appropriate resources/materials to ensure that all students participate fully). Make available to student teachers short YouTube video clips on the types of ecosystems.	Face-to-face/Group activity: Student teachers engage in talk for learning/ discussions on the types of ecosystems. Watch short U-tube videos on the types of ecosystem. Groups make 5-minutes presentations of their findings to the class who observe, ask questions and at the end write a one-page report. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Misconceptions about types of ecosystems	60 minutes	Face-to-face/Group activity: Keep student teachers in the same groups to engage in discussions to identify misconceptions/incorrect ideas about the ecosystems.	Face-to-face/Group activity: Groups to present their findings on misconceptions and incorrect ideas about ecosystems and the corresponding correct views in group reports. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	How to teach ecosystems	30 minutes	Face-to-face/Group activity: Allow student teacher groups to prepare at most a 10-minute lesson of what they have learnt	Face-to-face/Group activity: Student teachers, working in their groups make presentations to the class on the types of ecosystems while other groups 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 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 as learning: student teachers make presentations on at least four types of ecosystems. Assessment for learning: student teachers peer review presentations/chats and reports on the types of ecosystems. 			
Teaching Learning Resources	Projectors, Computers with internet access, Plants and animal Models, Online educational resources such as massive online open resources (MOOCs), YouTubes, khan https://www.youtube.com/watch?v=QGrNhojSAZg https://www.youtube.com/watch?v=l8Uj4yD0g6M			
Required Text (core)	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 effective use of online learning resources			

Lesson 11

Year of B.Ed.	2	Semester	1	Place of lesson in semester				1	2	3	4	5	6	7	8	9	10	11	12
Title of Lesson	Science Pedagogy and Curriculum										Lesson Duration	3 Hours							
Lesson description	In this course, student teachers would be expected to demonstrate knowledge of and develop the attitudes in biology that would lead to a better appreciation of the biological, physical and social environment and work as professional biology teachers to identify their own professional needs in terms of science professional practice, knowledge, values and attitudes. Through this experience the student teacher will be working towards meeting the NTS (NTS 1a, b and f, p12; 3a, c, f and j, p14).																		
Previous student teacher knowledge, prior learning (assumed)	Student teachers are familiar with the integrated science course (SCE 121) which was introduced in Level 100.																		
Possible barriers to learning in the lesson	Student teachers might have forgotten about the basic features of a science curriculum and revision would be required																		
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face√	Practical Activity	Work-Based Learning	Seminar √	Independent Study	e-learning opportunities √	Practicum												
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Discussion: Student-teachers critically review the biology curriculum vis-a-vis its implication on the adolescent learner so that they learn to plan lessons and interactive assessments with appropriate resources suitable for that category of learners (NTS 3a, 3h, p14: NTS 2c, 2d, 2e, p13 & 21) We have some NTS here and some in the next session. Is this how it has to be? Then we have to define all in full. Seminars: Face-to-face:																		
<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"> Demonstrate knowledge of and develop the attitudes in biology that will lead to a better appreciation of the biological, physical and social environment. Demonstrate basic ability to work as a professional biology teacher in school and identify one's own professional needs in terms of science professional practice, knowledge, values and attitudes. Through this experience the student-teacher will be working towards meeting the NTS (NTS 1a, b and f, p12; 3a, c, f and j, p14). <p>NTS: The teacher:</p> <p>1a: Critically and collectively reflects to improve teaching and learning.</p> <p>1f: Develops a positive teacher identity and acts as a good role model for students</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>3a: Plans and delivers varied and challenging lessons, showing a clear grasp of the intended outcomes of their teaching.</p> <p>3c: Creates a safe, encouraging learning environment.</p> <p>3f: Pays attention to all learners, especially girls and students with Special Educational Needs, ensuring their progress.</p> <p>3h: Sets meaningful tasks that encourages learner collaboration and leads to purposeful learning.</p> <p>3j: Produces and uses a variety of teaching and learning resources including ICT, to enhance 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.	
	<ul style="list-style-type: none"> • Demonstrate knowledge of and develop the attitudes in biology that will lead to a better appreciation of the physical and social environment. • Demonstrate basic ability to work as a professional biology teacher in school and to identify their own professional needs in terms of science professional practice, knowledge, values and attitudes 	<ul style="list-style-type: none"> • Use check list to identify the values of accuracy, honesty, precision, patience and orderliness in a Biology practical activity • sketch of expected class setting for a biology lesson that will provide for inclusion • Make a list of some items in a portfolio. E.g. Teaching philosophy, minutes from meeting with Supported Teaching in Schools (STS), lesson plan. • Make a list of student teacher's professional needs to develop 	By providing checklist of key features of the curriculum, sharing ideas in class, student-teachers develop the skills of writing portfolio, 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 Pedagogy and Curriculum	Psychology of the early adolescent in science studies	90 minutes	Face-to-face: Tutor allows studentteachers in groups of mixed abilities to peruse the science curriculum with respect to adolescent learners and present oral reports PD Theme 4, pg 23-30 Tutor shows videos of adolescent behaviour followed by discussions to identify misconceptions about adolescents and science learning	E-learning: Studentteachers in groups of mixed abilities make power point presentations on how to help adolescents to cope in class PD Theme 4, pg 35-46
	Introduction to science lesson plans and resources	45 minutes	Face-to-face: Tutor initiates discussions on key aspects of a lesson plan and how to develop it	Face-to-face/Group Activity: Student teachers work in mixed groups to develop 10-minute lesson plans on a given topic, suitable for teaching adolescents
	Micro teaching	45 minutes	Face-to-face: Tutor led discussion and demonstration	Develop a mini micro scale activity model for pupils' use from the curriculum and micro teach the introductory part for 5 minutes (2 groups at most) to reflect on aspects of a lesson plan

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 analysing components of the curriculum, student-teachers' will develop skills in compiling, reviewing, and evaluating literature on policies.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment as learning: Student teachers show evidence of mini lesson plans and their implications for adolescent children's learning habits.
Teaching Learning Resources	JHS Science Curriculum, projector, micro equipment or standard laboratory equipment, pens and papers.
Required Text (core)	JHS Science Curriculum; Handbook for PD Coordinators Themes 1- 10
CPD Requirement	<ol style="list-style-type: none"> Practicing how to review Science Curriculum. Critical examination, analysis and reflection by a student teacher.

Lesson 12

Year of B.Ed.	2	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	Course Review 2				Lesson Duration	3 Hours	
Lesson description	To review and audit the lessons for the second half of the semester (from lesson 7-lesson 11). It is also expected that student teachers will reflect during this lesson on their own progress in the course.						
Previous student teacher knowledge, prior learning (assumed)	Lessons learnt from lesson 7 through lesson 11 in all learning approaches.						
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, Same ability, mixed ability and gender-based group works. Practical Activity: Modelling, Concept Mapping and Cartooning. Independent Study: Tutor and student-teacher reflections (individually and collectively) e-learning Opportunities: OERs 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"> Ascertain the level of understanding of concepts. Test various skills and cross – cutting issues Provide remedial tuition/tutorials on where necessary Correct misconceptions and misinformation Build the necessary support going forward on SEN and Gender issue <p>NTS: The teacher:</p> <p>1a: Critically and collectively reflects to improve teaching and learning. 1f: Develops a positive teacher identity and acts as a good role model for students 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 2e: Understands how children develop and learn in diverse contexts and applies this in his or her teaching 3a: Plans and delivers varied and challenging lessons, showing a clear grasp of the intended outcomes of their teaching. 3c: Creates a safe, encouraging learning environment. 3f: Pays attention to all learners, especially girls and students with Special Educational Needs, ensuring their progress. 3h: Sets meaningful tasks that encourages learner collaboration and leads to purposeful learning. 3j: Produces and uses a variety of teaching and learning resources including ICT, to enhance 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"> Identify weakness and strengths in learning the science lesson for the period under review Be able to reflect on lessons learnt so far and state new insights and/or grey areas needing remedies Correct misconception/misinformation for lessons (lesson 7 – 11) 	<ul style="list-style-type: none"> Make a list of weaknesses and strengths on poster papers for sharing Provide a reflection report and answer questions on topics learnt so far through demonstrations and illustrations on a given media Present concept maps and/or models linking misconceptions/misinformation to new insights 	<p>Collaborations, Communication and research: through group work and presentation</p> <p>Equity and Reflection is developed from reflective activities</p> <p>Creativity and critical thinking are developed in creating models and concept maps</p>	
Content of lesson picked and developed from the course specification	Sub Topic Course Review 2	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
Course Review 2	Reviewing the understanding of the lesson Human Body I, Human Body II, Ecosystem I, Ecosystem II and Science Pedagogy and Curriculum	30 minutes 90minutes	<p>Face-to-face:Brainstorming with student teachers to initiate the weaknesses and strengths of student teachers in the lessons 7 – 11.</p> <p>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.</p> <p>The groups are provided with checklist on each topic so that they are able to list weakness and strengths.</p>	<p>Face-to-face: Student teachers responds to Tutor questions on weaknesses and strengths</p> <p>Working in groups and with the checklist student teachers identify and record all possible weaknesses and strengths in the lessons learnt so far.</p>
	Remedies to course topics	60minutes	<p>Face-to-face/Group Activity:Group student teachers according to remedy need and provide specific task assistance in the areas on concept needing remedy.</p>	Face-to-face/Group Activity: Students teachers work in the special groups (Same remedy need group) on tasks to remedy their learning need.
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. Assessment of learning: Student teachers working in groups on remedial tutoring (Checklist to identify and praise students for working collaboratively) 			

Teaching Learning Resources	Cardboards, Course manual, Poster paper
Required Text (core)	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

