

YEAR 2

SEMESTER 2

Four-Year B.Ed. Course Manual

Integrated Science II





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FOREWORD

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

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

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

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

Professor Mohammed Salifu

Director General, Ghana Tertiary Education Commission

ACKNOWLEDGEMENTS

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

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

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

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

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

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 who have, directly or indirectly, shared their views on the curriculum with us.

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INTRODUCTION TO COURSE MANUALS

Welcome to this B.Ed. Course manual.

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

The manuals serve the following purposes:

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

Specifically, they also:

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

Who are course manuals for:

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

USING THIS MANUAL

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

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

My teaching philosophy is

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

A. Course Information

Integrated Science for Upper Primary 2

The vision for the New B.Ed. Curriculum

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

i. Course Details

Course Name	Integrated Science for Upper Primary 2				
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 two 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: energy, forces, care of the skin, the solar system, mixtures and the primary school 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 early childhood (B3) to middle childhood (Upper Primary) (NTS, 2e, p.13), (NTS, 1a-c, p. 12), (NTS, 2c, P. 13).

3. Key Contextual Factors

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

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

The learning activities for this semester seeks to relate science to the learners' environment, make science culturally relevant and inclusive. It also seeks to promote professional scientific attitudes and skills development such as critical thinking, honesty, patience, sincerity, precision, and accuracy. Sensitive concepts may be explained within the appropriate local dialect and/or practices, in order to remove barriers that could prevent students of diverse abilities and strengths from participating in any science lesson, as well as managing transition from early childhood (B3) to middle childhood (Upper Primary)

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

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

5. Course Learning Outcomes

CLO1: Identify creative ways to teach energy, forces, care of the skin and mixtures at the primary level (NTS 2c, p.13 & 21)

CLO2: Develop creative learning activities that can make the primary school learner distinguish between components of the solar system (NTS 2c, p.13 & 21)

CLO3: Recognize that some metals and objects made from iron when exposed to moisture in the presence of air will form rust and explain the effect of rusting on iron and demonstrate methods of preventing rust (NTS 2c, p.13 & 21), (NTS 2c, p.13 & 21)

CLO4. Develop and use developmentally appropriate TLMs from locally available materials for teaching primary school measurement (NTS 3j, pg. 14)

6. Learning Indicators

- Develop science related games children can play and learn about energy, forces and mixtures.

- Create charts, concept maps and mind maps about metal and non-metals

- Present a mini project work on the conception of Energy, forces and key features of the Upper Primary curriculum.

- Prepare improvised, developmentally appropriate materials for teaching at the primary school level

CLO5: Demonstrate an understanding of the principles of professional development observed during STS through reflective reporting. (NTS, 2c & 3e, Pg. 14 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 primary school curriculum, laws protecting children and all relevant regulations, and model positive values, attitudes and behaviours. student teacher will be working towards meeting the NTS. (NTS 1b p14 & 18, 14)	<ul style="list-style-type: none"> Provide a checklist to identify values such as patience, critical thinking, precision and accuracy in a peer review exercise Prepare a list of some examples of professional needs and some characteristics of professional teachers

7. Course Content

Unit (Week)	Topic	Subtopic (if any)	Teaching and learning activity to achieve the learning outcomes
Week 1	Review of Year 2 Semester 1 integrated science	i. Recap of year, semester 2 lessons and challenges thereof.	i. Demonstrations and discussions ii. Reflections, presentations and designing iii. Role playing/song creations
	Energy I	i. Meaning of energy ii. sources of energy: food, sun, wind, water, battery, crude oil and natural gas	iv. Simulations, video and Computer presentation v. Produce charts and illustrations of forms and sources of energy
Week 2	Energy II	i. Forms and conversion/conservation of energy ii. Uses of solar energy: heating and burning	i. Demonstrations and group discussions ii. Reflections, presentations and designing/game development iii. Concept mapping iv. Simulations, video and Computer presentation
Week 3	Forces	i. Meaning of force and examples of forces: frictional, elastic, magnetic, gravitational, compression and uses of forces ii. Effects of forces on objects	Face-to Face: Discussion, Role Playing, Construction of games, Designing rhymes, creating songs about plants and animals e-learning: Video and Computer simulation on teaching activities and assessment strategies.
Week 4	Care of the Skin I	i. Diseases of the skin: ring worm, eczema, chicken pox, measles ii. Prevention of skin diseases iii. Misconception about skin diseases	Face-to-face: Mixed group discussions and demonstrations/role plays, Concept Mapping and Cartooning. e-learning/Reflections: Video presentations from MOOCs with reflections on values such as Honesty, Accuracy, Precision and critical thinking.
Week 5	The Solar System 1	i. Components of the solar system: sun, moon earth and other planets	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	i. Reviewing and reflecting on lessons 1-6 ii. STS Seminar	Face-to-face: Discussion, Talk for learning approaches with student teacher 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	The Solar System II	Movement of the moon around the earth Relative positions of the sun, moon and the earth	Face-to-face discussions, demonstration, mixed group work Computer simulations and OERs sources
Week 8	Heavenly Bodies	i. Luminous and non-luminous bodies ii. Satellites and uses of satellites	Face-to-face discussions, demonstration, mixed group work Computer simulations and OERs sources
Week 9	Mixtures I	i. Concepts of Mixtures ii. Types of mixtures: Solid-solid, Liquid-liquid, Liquid-solid, Gas-gas, Liquid-gas	Independent Study: Inquiry and reflections Face-to-Face: Discussions, Role playing and Rhyme designing
Week 10	Mixtures II	i. Methods of separation of mixtures	Face-to-Face: Think, Pair, Share, Share discussions, Reflections and rhyming e-learning: OERs and MOOCs with report writing
Week 11	Upper Primary Integrated Science Curriculum	i. Key features of the upper primary integrated science curriculum	Face-to-Face: Modelling, Role playing and developing games.
Week 12	Course Review II with STS seminar	i. Reviewing and reflecting on lessons 7-11 ii. 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.

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%~~

CLO2, CLO3, CLO4 and CLO6

NTS:

1a) Critically and collectively reflects to improve teaching and learning

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

3m) Identifies and remediates learners' difficulties or misconceptions, referring learners whose needs lie outside the competency of the teacher

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)

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, CLO5

NTS:

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

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

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

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

Component 3: Assessment as Learning (Review of Reports)

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

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

Weighting: 30%

CLO1-CLO6

NTS:

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

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

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

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

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	2	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Energy I				Lesson Duration	3 Hours	
Lesson description	In this lesson, Tutor discusses Energy I with Student teachers. Tutor and student teachers will discuss Energy I by looking at the Meaning of energy and Sources of Energy. This lesson will enable student teachers have an insight into how Energy can be taught in an integrated manner. Thus the lesson will look at the Meaning of Energy from various perspectives (Biology, Chemistry and Physics). The student teachers are expected to use the knowledge gathered in designing a lesson on how to teach “Meaning of energy and Sources of Energy (e.g. food, sun, wind, water, battery, crude oil and natural gas) to the basic school learner. This first lesson introduces student teachers to the course learning outcomes and the three assessment components of the course						
Previous student teacher knowledge, prior learning (assumed)	Student teachers are aware of some of the various forms of energy, like energy from Sun, heat energy and electrical energy.						
Possible barriers to learning in the lesson	Student teachers may: <ul style="list-style-type: none"> • Have misconceptions of the “Meaning of Energy”. Student teachers may see energy as power or force. • Not have the skills in teaching Energy I (Meaning of Energy and Sources of Energy) to the Basic School learner. 						
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face √	Practical Activity	Work-Based Learning	Seminars	Independent Study √	e-learning opportunities √	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to Face: Discussion, Tutor and student teachers’ interactions on the meaning and sources of energy 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"> • Train student teachers to have insight into how Energy (Meaning of Energy and Sources of Energy) is taught in an integrated manner (from various perspectives as in Physics, Chemistry and Biology) • Demonstrate the skill and knowledge to teach the “Meaning of energy and Sources of Energy” to the basic school learner National Teachers’ Standards: The teacher; 2c) Has secured content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 3g) Employs instructional strategies appropriate for mixed ability, multilingual and multi-age classes. 3j) Produces and uses a variety of teaching and learning resources including ICT, to enhance learning.						
<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"> • 1. Explain the concept of energy and identify some sources and forms of energy (NTS 2c, 3g, 3j) 		<ul style="list-style-type: none"> • Provide evidence of knowledge of concept of energy and sources of energy 		Sharing ideas in class on the meaning and sources of energy, student teachers develop skills of communication, collaboration		

			and mutual respect while appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion.	
Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
Energy I B4.4.1.1.1	<p>i. Introduction of the Upper Primary course manual and recap of semester 1</p> <p>ii. Meaning of energy</p>	60 minutes	<p>i. Face-to-face: Tutor makes available copies of the Upper Primary course manual. For student teachers to independently and in groups glance through and give their expectations for discussion. Tutor guides student teachers to recap Semester 1 lessons in order to build on that of semester 2.</p> <p>ii. Face-to-face: Tutor introduces the lesson by reviewing Student teachers relevant previous knowledge on Energy.</p> <p>iii. Face-to-face: Open-ended questions to elicit misconceptions/incorrect ideas about Energy</p> <p>iv. Face-to-face: Tutor guides student teachers to form groups of 3 members (intellectual ability groups) establish the Meaning of Energy in an integrated manner (Physics, Chemistry and Biology). For example, energy in Physics is the ability to do work, in Chemistry, chemical energy is that released as a result of a chemical reaction, as in the metabolism of food, whereas in Biology, it is usually expressed as muscle contractions and heat production especially in humans. Allow student teachers to produce written reports of the meaning of energy in an integrated manner.</p>	<p>i. Student teachers independently study the Upper Primary course manual and write down their expectations for class discussion. They bring out their views on the courses they read in Semester 1 and how that relates to semester 2.</p> <p>ii. Face-to-face: Student teachers tell their previous knowledge on Energy.</p> <p>iii. Face-to-face: Student teachers answer open-ended questions to bring their incorrect ideas on Energy.</p> <p>iv. Face-to-face: Student teachers form groups of 3 members (intellectual ability) and establish the meaning/concept of Energy in an integrated manner (Physics, Chemistry and Biology). Student teachers produce written reports of the meaning of energy in an integrated manner.</p>

	iii. Sources of energy: food, sun, wind, water, battery, crude oil and natural gas	40 minutes	i. Face-to-face: Allow student teachers to form groups of 3 members each (gender-based groups) to brainstorm to come out with the examples of sources of energy (food, sun, wind, water, battery, crude oil and natural gas). ii. Face-to-face/E-learning: In mixed groups (gender-based) of 3 members guide student teachers to use videos/simulations from the internet to discuss how each of the following produces energy: food, sun, wind, water, battery, crude oil and natural gas. Allow student teachers to produce charts on this.	i. Face-to-face: Student teachers brainstorm (gender-based groups) to come out with examples of sources of energy (food, sun, wind, water, battery, crude oil and natural gas). ii. Face-to-face: In mixed groups (gender-based) of 3 members, student teachers use videos/simulations from the internet discuss how the food, sun, wind, water, battery, crude oil and natural gas produce energy. Students produce charts.
	iii. Teaching of how to teach Energy I (Meaning of energy, ii. Sources of energy: food, sun, wind, water, battery, crude oil and natural gas) to the Basic school learner	80 minutes	iii. Face-to-face/E-learning opportunities/group activity: Tutor allows student teachers to watch simulations and videos and then to do short power point/poster presentation on how to teach Energy I (Meaning of energy, Sources of energy: food, sun, wind, water, battery, crude oil and natural gas) to the Basic school learner (Mixed intellectual ability Groups of 3 members). Provide student teachers with simulations and videos on the topic	ii. Face-to-face/E-learning opportunities/group activity: Student teachers in groups use simulations and watch short videos then prepare power point/poster presentation on how to teach Energy I (Meaning of energy, Sources of energy: food, sun, wind, water, battery, crude oil and natural gas) to the Basic school learner simple machines to the Basic School Learner.
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. By practicing with how to teach the meaning and sources of energy, student-teachers' difficulties in the teaching skills of the subject matter will be addressed.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment for learning: Charts produced by student teachers on sources of energy using videos/simulations from the internet NTS 3j: Produces and uses a variety of teaching and learning resources including ICT, to enhance learning. Assessment as learning: Student teachers produce written reports of the meaning of energy in an integrated manner. NTS 3e: Employs a variety of instructional strategies that encourages student participation and critical thinking Assessment of learning: Student teachers do short presentations (3-5 minutes each) on how to teach the “Meaning of energy and Sources of Energy” to the Basic school learner (Reflection on presentations). NTS 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 			

Teaching Resources	Learning	Manila cards, projectors, pens and A-4 sheets for writing reports, desktop computers with internet access https://www.green-the-world.net/definition_of_energy.html https://www.conserve-energy-future.com/different-energy-sources.php https://www.e-education.psu.edu/geog432/node/114
Required Text (core)		NaCCA, Ministry of Education (2019). <i>Science Curriculum for Primary Schools (B4-B6)</i> . Accra: Ministry of Education. 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 the formation of appropriate mixed ability groups, how to tolerate each other during group work and practicing how to teach “Meaning and Sources of Energy” accurately using those groupings.
Course Assessment		¹ Component 1: Subject Portfolio Assessment (30% overall score) <ul style="list-style-type: none"> • Selected Item of Student work (3 items – 10%) = 30% • Midterm assessment – 20% • Reflective Journal – 40% • Organization of the Subject Portfolio- 10% (How its presented/organized) ² Component 2: Subject Project (30% overall Semester score) <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% Component 3: End of Semester Examination – (40% overall Semester Assessment)

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

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

Lesson 2

Year of B.Ed.	2	Semester	2	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12		
Title of Lesson	Energy II			Lesson Duration	3 Hours		
Lesson description	In this lesson, Tutor discusses Energy II with Student teachers. Energy II will be discussed by looking at the Forms, Conversion and Uses of Energy. Student teachers will appreciate the fact that Energy is everywhere. Anything we eat or use has energy embodied in it. Every object we produce required energy to make and/ or energy to transport, and the energy demands are closely linked to the economic growth of a country. This lesson will also enable student teachers to demonstrate how to teach Forms, Conversion and Uses of Energy to the Basic School Learner.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers have conceptual meaning of energy in an integrated manner and can list sources of energy.						
Possible barriers to learning in the lesson	Student teachers may: <ul style="list-style-type: none"> Have misconceptions of Forms and conversion/ conservation of energy and uses of solar energy in the world around them that may be different from the descriptions scientists use. Not have the skills in teaching Forms and conversion/ conservation of energy and uses of solar energy to the Basic School learner. 						
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face √	Practical Activity √	Work-Based Learning	Seminars	Independent Study √	e-learning opportunities √	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to Face: Discussion, Tutor and student teachers' interactions on forms and conversion/conservation and uses of energy Practical Activity: Practical demonstration of conversion of energy 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"> Appreciate conservation of energy. Identify the forms and uses of energy. Demonstrate the skill and knowledge to teach Forms and Conversion/ Conservation of Energy and Uses of Solar Energy. National Teachers' Standards: The teacher; 2c) Has secured content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 3e) Employs a variety of instructional strategies that encourages student participation and critical thinking. 3l) Listens to learners and gives constructive feedback.						
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes		Learning Indicators		Identify which cross – cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed		
	<ul style="list-style-type: none"> Explain the concept of energy and identify some sources and forms of energy (NTS 2c, 3e. 3l) 		<ul style="list-style-type: none"> Provide concept map on forms, conversions/conservation and uses of energy 		Good identification of energy conservations/conversions and uses, student teachers develop skills of communication, collaboration and mutual respect while appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion.		

Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
Energy II B5.4.1.1.1 B5.4.1.2.1	i. Forms and conversion/conservation of energy	80 minutes	<p>i. Face-to-face: Tutor introduces the lesson by reviewing student teachers knowledge on meaning and sources of Energy.</p> <p>ii. Face-to-face: Open-ended questions to elicit misconceptions/incorrect ideas about Forms and Conversion/Conservation of Energy.</p> <p>iii. Face-to-face: Tutor guides student teachers to form groups of 3 members according to intellectual ability to discuss the Forms and Conversion/Conservation of Energy. Allow student teachers to produce concept maps on Forms and conversion/conservation of energy.</p>	<p>i. Face-to-face: Student teachers tell their previous knowledge on meaning and sources of Energy.</p> <p>ii. Face-to-face: Student teachers answer open-ended questions to bring their incorrect ideas on Forms and Conversion/Conservation of Energy.</p> <p>iii. Face-to-face: Student teachers form groups of 3 members according to intellectual ability to discuss and produce concept maps on the Forms and Conversion/Conservation of Energy.</p>
	ii. Uses of solar energy: heating and burning	40 minutes	<p>i. Face-to-face: Allow student teachers to brainstorm and produce a chart on the uses of energy (especially on solar energy-heating and burning).</p> <p>ii. Face-to-face/E-learning: In mixed groups (gender-based) of 3 members guide student teachers to use videos/simulations from the internet to discuss the uses of energy, especially on heating and burning. Allow student teachers to produce charts on this. Student teachers to produce charts on the uses of energy.</p>	<p>i. Face-to-face: Student teachers brainstorm and produce a chart on the uses of energy (especially on solar energy-heating and burning).</p> <p>ii. Face-to-face: In mixed groups (gender-based) of 3 members, student teachers use videos/simulations from the internet discuss the uses of energy, especially on heating and burning. Students produce charts on uses of energy.</p>

	iii. Teaching of how to teach Energy II (Forms and conversion/conservation of energy, uses of solar energy: heating and burning) to the Basic school learner	60 minutes	ii. Face-to-face/e-learning opportunities: Tutor allows student teachers to do short power point/poster presentation on how to teach Energy II (Forms and conversion/conservation of energy, uses of solar energy: heating and burning) to the Basic school learner (Mixed intellectual ability Groups of 3 members).	iii. Face-to-face/e-learning opportunities: Student teachers in groups do power point/poster presentation on how to teach Energy I (Forms and conversion/conservation of energy, uses of solar energy: heating and burning) to the Basic school learner.
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. By practicing how to teach Forms, Conversion and Uses of Energy, student-teachers' difficulties in the teaching skills of the subject matter will be addressed.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> • Assessment for learning: Concept maps produced by student teachers on Forms and Conversion/ Conservation of Energy. NTS 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. • Assessment for learning; Charts produced by student teachers of on Uses of Solar energy/Energy. NTS 3e: Employs a variety of instructional strategies that encourages student participation and critical thinking. • Assessment of learning: Student teachers do short presentations (3-5 minutes each) on how to teach Forms and Conversion/ Conservation of Energy and Uses of Energy to the Basic school learner (Reflection on presentations). NTS 3I: Listens to learners and gives constructive feedback. 			
Teaching Learning Resources	Projectors, Manila cards for chart and drawing of concept maps, markers, desktop computers with internet access https://www.youtube.com/watch?v=jkqcfswRXY8 https://www.teachengineering.org/lessons/view/cla_lesson4_forms_states_conversions http://www.energyglobalnews.com/five-different-uses-of-energy-in-our-daily-lives/			
Required Text (core)	NaCCA, Ministry of Education (2019). <i>Science Curriculum for Primary Schools (B4-B6)</i> . Accra: Ministry of Education 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 the design and use of power point presentations for teaching and learning			

Lesson 3

Year of B.Ed.	2	Semester	2	Place of lesson in semester	12 3 4 5 6 7 8 9 10 11 12		
Title of Lesson	Forces			Lesson Duration	3 Hours		
Lesson description	In this lesson, Tutor discusses Forces with student teachers. Meaning of force, examples of forces, uses and effects of forces on objects are the areas that will be considered. This lesson will enable student teachers to recognize what a force does in our daily life activities. Without force, people would not be able to open and close doors or lift up their arms or legs or anything, for that matter. Again, this lesson will allow student teachers to demonstrate how to teach meaning of force, examples of forces, uses and effects of forces on objects to the Basic School Learner.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers have the idea that a push or a pull of an object constitute a force.						
Possible barriers to learning in the lesson	Student teachers may: <ul style="list-style-type: none"> • Have misconceptions of a force (meaning of force, examples of forces, uses and effects of forces on objects) in the world around them that may be different from the descriptions scientists use. • Not have the skills in teaching meaning of force, examples of forces, uses and effects of forces on objects to the Basic School learner. 						
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face ✓	Practical Activity ✓	Work-Based Learning	Seminars	Independent Study ✓	e-learning opportunities ✓	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to Face: Discussion, Tutor and student teachers' interactions on forces Practical Activity: Practical manipulation of objects to demonstrate a force 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"> • Appreciate conservation of energy. • Identify the forms and uses of energy. • Demonstrate the skill and knowledge to teach Forces (Meaning of force and examples of forces: frictional, elastic, magnetic, gravitational, compression and uses of forces) to the Basic School Learner National Teachers' Standards: The teacher; 1c) Demonstrates effective growing leadership qualities in the classroom and wider school. 2c) Has secured content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 3e) Employs a variety of instructional strategies that encourages student participation and critical thinking.						

<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 different types of forces and describe their effects in everyday life activities (NTS 1c, 2c, 3e) 	<ul style="list-style-type: none"> Present a chart on different types of forces and their corresponding effects in everyday life activities Produce a chart on different types of forces and their effects in everyday life situations. 	Good identification of examples of forces, uses and their effects on objects, Student teachers develop skills of communication, collaboration and mutual respect while appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion.							
Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study							
			<table border="1"> <thead> <tr> <th>Teacher Activity</th> <th>Student Activity</th> </tr> </thead> <tbody> <tr> <td> i. Face-to-face: Tutor introduces the lesson by reviewing Student teachers previous knowledge on forces. ii. Face-to-face: Open-ended questions to elicit misconceptions/incorrect ideas about forces. iii. Face-to-face/Practical Activity: Tutor guides student teachers to form mixed ability groups to demonstrate forces and watch videos on force. Then then; <ul style="list-style-type: none"> establish the conceptual meaning and effect of a force. analyse examples of forces (frictional, elastic, magnetic, gravitational, compression) using real objects (like magnets, rough surfaces, trolleys, springs), simulations and multimedia. Allow student teachers to produce charts on examples and uses of forces. </td> <td> i. Face-to-face: Student teachers tell their previous knowledge on forces. ii. Face-to-face: Student teachers answer open-ended questions to bring their incorrect ideas on forces. iii. Face-to-face/ Practical Activity: Student teachers form groups of mixed ability demonstrate forces and also watch videos on forces. (Student teachers search online for videos on ‘the effect of forces’) Student teachers produce charts on examples and uses of forces. </td> </tr> <tr> <td> ii. Effects of forces on objects </td> <td> i. Face-to-face: Allow student teachers to brainstorm to come out with effects of forces on objects. ii. Practical Activity: In mixed groups (gender-based) of 3 members </td> <td> i. Face-to-face: Student teachers brainstorm to come out with the effect of forces on objects. ii. Practical Activity: In mixed groups (gender-based) of 3 members, </td> </tr> </tbody> </table>	Teacher Activity	Student Activity	i. Face-to-face: Tutor introduces the lesson by reviewing Student teachers previous knowledge on forces. ii. Face-to-face: Open-ended questions to elicit misconceptions/incorrect ideas about forces. iii. Face-to-face/Practical Activity: Tutor guides student teachers to form mixed ability groups to demonstrate forces and watch videos on force. Then then; <ul style="list-style-type: none"> establish the conceptual meaning and effect of a force. analyse examples of forces (frictional, elastic, magnetic, gravitational, compression) using real objects (like magnets, rough surfaces, trolleys, springs), simulations and multimedia. Allow student teachers to produce charts on examples and uses of forces.	i. Face-to-face: Student teachers tell their previous knowledge on forces. ii. Face-to-face: Student teachers answer open-ended questions to bring their incorrect ideas on forces. iii. Face-to-face/ Practical Activity: Student teachers form groups of mixed ability demonstrate forces and also watch videos on forces. (Student teachers search online for videos on ‘the effect of forces’) Student teachers produce charts on examples and uses of forces.	ii. Effects of forces on objects	i. Face-to-face: Allow student teachers to brainstorm to come out with effects of forces on objects. ii. Practical Activity: In mixed groups (gender-based) of 3 members	i. Face-to-face: Student teachers brainstorm to come out with the effect of forces on objects. ii. Practical Activity: In mixed groups (gender-based) of 3 members,
Teacher Activity	Student Activity									
i. Face-to-face: Tutor introduces the lesson by reviewing Student teachers previous knowledge on forces. ii. Face-to-face: Open-ended questions to elicit misconceptions/incorrect ideas about forces. iii. Face-to-face/Practical Activity: Tutor guides student teachers to form mixed ability groups to demonstrate forces and watch videos on force. Then then; <ul style="list-style-type: none"> establish the conceptual meaning and effect of a force. analyse examples of forces (frictional, elastic, magnetic, gravitational, compression) using real objects (like magnets, rough surfaces, trolleys, springs), simulations and multimedia. Allow student teachers to produce charts on examples and uses of forces.	i. Face-to-face: Student teachers tell their previous knowledge on forces. ii. Face-to-face: Student teachers answer open-ended questions to bring their incorrect ideas on forces. iii. Face-to-face/ Practical Activity: Student teachers form groups of mixed ability demonstrate forces and also watch videos on forces. (Student teachers search online for videos on ‘the effect of forces’) Student teachers produce charts on examples and uses of forces.									
ii. Effects of forces on objects	i. Face-to-face: Allow student teachers to brainstorm to come out with effects of forces on objects. ii. Practical Activity: In mixed groups (gender-based) of 3 members	i. Face-to-face: Student teachers brainstorm to come out with the effect of forces on objects. ii. Practical Activity: In mixed groups (gender-based) of 3 members,								
Forces B4.4.3.1.1	i. Meaning of force and examples of forces: frictional, elastic, magnetic, gravitational, compression and uses of forces	80 minutes								
	ii. Effects of forces on objects	40 minutes								

			<p>guide student teachers to use real objects to demonstrate application/effect of forces in everyday life. For example the use of soccer/football, hammer, empty containers and trolleys to demonstrate application/effect of forces in everyday life.</p> <p>iii. Face-to-face/e-learning: Allow student teachers to use videos/simulations from the internet to discuss the effect of forces on objects (in gender base mixed groups of 3 members). Student teachers produce charts to display the effect of force on objects.</p>	<p>student teachers use real objects to demonstrate application/effect of forces in everyday life. For example the use of soccer/football, hammer, empty containers and trolleys to demonstrate application/effect of forces in everyday life.</p> <p>iii. Student teachers use videos/simulations from the internet to discuss the effect of forces on objects (in gender base mixed groups of 3 members). Student teachers produce charts to display the effect of force on objects.</p>
	<p>iii. How to teach Forces (Effects of forces on objects) to the Basic school learner</p>	60 minutes	<p>i. Face-to-face/e-learning opportunities: Tutor allows student teachers to do short power point/poster presentation on how to teach Forces (Effects of forces on objects) to the Basic school learner (Mixed intellectual ability Groups of 3 members).</p>	<p>ii. Face-to-face/e-learning opportunities: Student teachers in groups do power point/poster presentation on how to teach Forces (Effects of forces on objects) to the Basic school learner.</p>
Which cross cutting issues will be addressed or developed and how	<p>Equity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. By practicing how to teach Forces (Effects of forces on objects), student-teachers' difficulties in the teaching skills of the subject matter will be addressed.</p>			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment for learning: Charts produced by student teachers of on meaning, examples and uses of forces. NTS 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. Assessment as learning: Charts produced by student teachers of on Effects of force on objects. NTS 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. Assessment of learning: Student teachers do short presentations (3-5 minutes each) on how to teach Forces (Effects of forces on objects) to the Basic school learner (Reflection on presentations). NTS 3e: Employs a variety of instructional strategies that encourages student participation and critical thinking 			
Teaching Learning Resources	<p>Projectors, Manila cards for chart, soccer/football, hammer, empty containers, trolleys, desktop computers with internet access</p> <p>https://www.youtube.com/watch?v=hNPiB9xDTrc</p> <p>https://www.toppr.com/guides/physics/force-and-pressure/force-and-its-effects/</p> <p>https://www.thoughtco.com/force-2698978</p>			

Required (core) Text	<p>NaCCA, Ministry of Education (2019). <i>Science Curriculum for Primary Schools (B4-B6)</i>. Accra: Ministry of Education.</p> <p>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</p>
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	<p>Practical training on the teaching of forces and other scientific concepts using multi-media resources</p>

Lesson 4

Year of B.Ed.	2	Semester	2	Place of lesson in semester	12 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Care of the Skin				Lesson Duration	3 Hours	
Lesson description	In this lesson, the Tutor will assist the student-teacher to review previous knowledge on personal hygiene and skin diseases which are topics under care of the skin aspects of which were studied in the lower primary. The lesson will then deepen their knowledge of diseases of the skin and their prevention. They will be exposed to teaching strategies and material so that they will effectively handle similar topics in their future science classrooms.						
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have studied personal hygiene and diseases at the lower primary						
Possible barriers to learning in the lesson	Student-teacher might still have unscientific beliefs about diseases and their cure/prevention.						
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face V	Practical Activity	Work-Based Learning	Seminars	Independent Study	e-learning opportunities	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to-face: Discussion, Talk for learning approaches with student-teacher presentations, questioning techniques, mixed ability group work						
<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"> Deepen student-teachers' basic concepts on diseases of the skin and their prevention Correct student-teachers' unscientific cultural beliefs about the causes of diseases and their prevention Build the necessary support going forward on SEN and Gender issue Provide student teachers with the requisite knowledge and skills to be able to teach the topic 'care of the skin' <p>National Teachers' Standards: The teacher;</p> <p>1c) Demonstrates effective growing leadership qualities in the classroom and wider school.</p> <p>2c) Has secured content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in.</p> <p>3e) Employs a variety of instructional strategies that encourages student participation and critical thinking.</p> <p>3f) Pays attention to all learners, especially girls and students with Special Educational Needs, ensuring their progress.</p>						
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes <ul style="list-style-type: none"> Identify unscientific cultural beliefs about incidence of skin diseases (NTS 1c, 2c, 3e) Identify diseases of the skin (NTS 3e, 3f) Describe how diseases of the skin can be prevented (NTS 1c) 	Learning Indicators <ul style="list-style-type: none"> Student-teachers provide evidence that they have considered learners' unscientific cultural beliefs about causes of skin diseases (Refer to NTS 3e) Student-teachers, in mixed ability groups provide charts to show common diseases of the skin and their corresponding prevention Student-teachers in mixed ability/gender-based groups to present write up describing how diseases of the skin can be prevented 	Identify which cross – cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed				
						Develop skills of construction of checklist Develop skills of construction of chart Developing Social collaboration and attention and care to individual needs (SEN) through group work	

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
Care of the Skin B4.5.1.1.1 B4.4.2.1.1	Misconception about skin diseases	40 minutes	Tutor through open-ended questioning elicit student-teachers' unscientific cultural beliefs about the causes of skin diseases	Studentteachers in groups prepare a checklist of unscientific cultural beliefs about causes of skin diseases
	Diseases of the skin: ring worm, eczema, chicken pox, measles	70 minutes	Tutor to put studentteachers into mixed ability/gender-based groups to discuss causes of some skin diseases	Studentteachers in groups to present T-chart list of skin diseases with their corresponding cause/causes
	Prevention of skin diseases	70 minutes	Tutor to guide studentteachers in inclusive groups through open-ended questions to come out with preventive measures against skin diseases	Studentteachers to, in inclusive groups present T-Charts of skin diseases and their corresponding preventive measures (refer to PD Theme 3, pg63,81: PD Theme 3, pg 121)
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. 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 provide checklist on unscientific cultural beliefs on the causes of skin diseases. NTS 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. Assessment as Learning: Student Teachers present T-charts on skin diseases and their corresponding causes. NTS 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. Assessment of learning: Student teachers present group T-charts on preventive measures against skin diseases. NTS 3e: Employs a variety of instructional strategies that encourages student participation and critical thinking. NTS 3f: Pays attention to all learners, especially girls and students with Special Educational Needs, ensuring their progress. 			
Teaching Learning Resources	The Course Manual, Flip Charts, Pens, Pencils, 'A' 4 sheets, markers, work sheets,			
Required Text (core)	NaCCA, Ministry of Education (2019). <i>Science Curriculum for Primary Schools (B4-B6)</i> . Accra: Ministry of Education. 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. 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			
Additional Reading List	Yeboah, S. K., Ahordji, & Mensah, S. K. (2016). <i>Science for primary schools: Pupil's book 5</i> , Accra: Sam-Woode Ltd. Available Primary and Junior high school science textbooks			
CPD Requirement	Training on skills for construction of checklists, and T-charts, training on open-ended questioning skills, developing skills in formation of mixed ability and gender-based groups			

Lesson 5

Year of B.Ed.	2	Semester	2	Place of lesson in semester	12 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	The Solar System 1				Lesson Duration	3 Hours	
Lesson description	In this lesson, Tutor discusses the Solar System in general with Student teachers. Mainly, the Sun and the collection of all of its companions that travel through space together along with it is known as the Solar System. There are a variety of objects in the Solar System. Student teachers will look at the components of the solar system: sun, moon earth and other planets. The following assessment modes will be used: examination, tests, project work, class assignments and presentations and portfolio.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers are conversant with the planet Earth, movement of the earth round the sun resulting in day and night.						
Possible barriers to learning in the lesson	Student-teachers may: <ul style="list-style-type: none"> • Have misconception of the Earth spinning on its axis and moving round the sun. • Not have the skills of teaching solar system due to the physics bias nature of this topic. 						
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"> • Use charts and digital content to describe the various components of the solar system. • Brainstorm to explain the following terms: Star, Galaxy, and the Milky way • Outline the relationship between the Sun and the Earth in the galaxy. • List the planets of the solar system in the correct order by their distances from the Sun. • use Acronyms to easily remember the planets' relation to the sun if they memorize the sentence, <i>My Very Eye May Just Seen Under Nine Planets</i>. 						
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	The student teachers will <ul style="list-style-type: none"> • recognise that a system is a whole, consisting of parts that work together to perform a function as in a solar system. • gain an understanding of the motion of bodies in the solar system. • discuss the composition of the Sun, Moon and Earth. For example, the Earth is made up of rocks, water and air. 						
Write in full aspects of the NTS addressed	National Teachers' Standards: The teacher; 1a) Critically and collectively reflects to improve teaching and learning. 1c) Demonstrates effective growing leadership qualities in the classroom and wider school. 2c) Has secured content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 3e) Employs a variety of instructional strategies that encourages student participation and critical thinking.						

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
Learning indicators for each learning outcome	<ul style="list-style-type: none"> Describe the components of the solar system (NTS 1a). Explain what a star is (NTS 2c, 3e). List the planets of the solar system (NTS 2c). Describe what the Sun, Moon and Earth are composed of. (NTS 1a; 1c). 		The student teachers <ul style="list-style-type: none"> Construct the solar system using beads and strings, Discuss the composition of the Sun, Moon and Earth. For example, the Earth is made up of rocks, water and air. 	Demonstrate knowledge and understanding of the development of the planetary system Use appropriate pedagogies to teach the solar system. Apply relevant ICT tools in planetary 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
The Solar System I B4.2.1.2.1	Components of the solar system: sun, moon earth	60 minutes	Face-to-face: Tutor <ul style="list-style-type: none"> discusses the solar system. discuss the composition of the Sun, Moon and Earth Discuss the planet, stars and the galaxy. Samples of exercises on how student teachers describe /explain components of the solar system; sun, moon earth and other planets. Use Charts produced by student-teachers on the solar system and the benefits such as day & night. Student teachers doing short presentations (3-5 minutes each) on how to teach the solar systems. 	Face-to-face: Student teachers <ul style="list-style-type: none"> use variety of teaching and learning resources such as videos and documentary on models of earth evolution from YouTube use charts and digital content to describe the various components of the solar system. brainstorm to explain the following terms: Star, Galaxy, and the Milky way Outline the relationship between the Sun and the Earth in the galaxy. Students discuss the planets as components of the Solar System. They write the list of the planets in their Science Journals using the sequence in order from the Sun. Students research individual planets in groups.
	Other Planets	60 minutes	Face-to-face: Tutor <ul style="list-style-type: none"> Discuss the planet, stars and the galaxy. Samples of exercises on how student teachers describe/explain sun, moon earth and other planets; movement of the moon around the earth; relative positions of the 	Face-to-face: Student teachers <ul style="list-style-type: none"> use variety of teaching and learning resources such as videos and documentary on models of earth evolution from YouTube brainstorm to explain the following terms: Star,

			sun, moon and the earth, satellites and uses of satellites. Student teachers use Acronyms to easily remember the planets' relation to the sun if they memorize the sentence, <i>My Very Eye May Just Seen Under Nine Planets</i> .	Galaxy, and the Milky way Outline the relationship between the Sun and the Earth in the galaxy.
		60 minutes	Tutor allows student teachers to do independent study.	<ul style="list-style-type: none"> Students discuss the planets as components of the Solar System. They write the list of the planets in their Science Journals using the sequence in order from the Sun. Explain that the first letter of each word in that acronym represents the name of a planet in relation to the sun.
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. By practicing with solar system and the benefits such as day & night, student–teachers’ difficulties of linking the concept will be addressed.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment for learning: Student teachers’ explain that the first letter of each word in that acronym represents the name of a planet in relation to the sun. NTS 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. Assessment as learning: Student teachers to complete the worksheet on Our Solar System with a partner. NTS 3e: Employs a variety of instructional strategies that encourages student participation and critical thinking Assessment of learning: Student teachers doing short presentations (3-5 minutes each) on how to teach Our Solar System (Reflection on presentations). NTS 1a: Critically and collectively reflects to improve teaching and learning. NTS 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. <p>Support: Ask students to draw and colour a picture of the solar system. This will enable students to visualize the position of the planets in relation to the sun. Have them label the names of the planets using the <i>My Very Eye May Just Seen Under Nine Planets</i> acronym.</p>			
Teaching Learning Resources	Balloon globe, balls of various sizes, touch light. https://www.education.com/activity/article/solar-system-kids/ https://www.education.com/activity/article/solar-eclipse/ https://www.youtube.com/watch?v=Qd6nLM2QIww https://www.youtube.com/watch?v=-I3VQbOvJ8M			
Required Text (core)	NaCCA, Ministry of Education (2019). <i>Science Curriculum for Primary Schools (B4-B6)</i> . Accra: Ministry of Education. 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	Workshop on how to improvise, run PhEt simulations, set relevant demonstrations. Practicing how to analyse the relative motions among the sun, moon and the earth accurately/correctly.

Lesson 6

Year of B.Ed.	2	Semester	2	Place of lesson in semester	12 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Course Review I and STS Seminar				Lesson Duration	3 Hours
Lesson description	This lesson is a review and audit of the lessons for the first half of the semester as well as review and discussion of lessons learned, reflection on observations made during the supported teaching in schools (STS).					
Previous student teacher knowledge, prior learning (assumed)	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.					
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face √	Practical Activity √	Work-Based Learning	Seminars √	Independent Study √	e-learning opportunities √
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to-Face: Discussion, 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 Seminar: Presentations on STS progress and discussions					
<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 NTS: 3e) Produces and uses a variety of teaching and learning resources including ICT, to enhance learning. 3j) Produces and uses a variety of teaching and learning resources including ICT, to enhance learning.					
<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(NTS 3e) 	<ul style="list-style-type: none"> Make a list of Weaknesses and strengths on poster papers for sharing 		Collaborations, Communication and Research: Through group work and presentation		
	<ul style="list-style-type: none"> Be able to reflect on lessons learnt and progress in STS so far and state new insights and/or grey areas needing remedies (NTS 3j) 	<ul style="list-style-type: none"> Provide a reflection report and answer questions on topics learnt so far through demonstrations and illustrations on a given media 		Equity and Reflection is developed from reflective activities		
	<ul style="list-style-type: none"> Correct misconception/misinformation for earlier (lesson 1 – 5) lessons 	<ul style="list-style-type: none"> Present concept maps and/or models linking misconceptions/misinformation to new insights 		Creativity and critical thinking is developed in developing models and concept maps		

Content of lesson picked and developed from the course specification	Sub Topic	Time Stage or	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 I and STS Seminar	i. Reviewing the understanding of the lessons Energy I, Energy II, Forces, Care of the Skin I and The Solar System 1	30 minutes 30minutes	i. Face-to-Face: Brainstorming with student teachers to initiate the weaknesses and strengths of student – teachers in the lessons 1 – 5. ii. Face-to-Face: 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. iii. The groups are provided with checklist on each topic so that they are able to list weakness and strengths.	Face-to-Face: Student teachers responds to Tutor questions on weaknesses and strengths Face-to-Face: Working in groups and with the checklist student teachers identify and record all possible weaknesses and strengths in the lessons learnt so far.
	iv. Remedies to course topics	60minutes	Face-to-Face: Group student teachers according to remedy need and provide specific task assistance in the areas on concept needing remedy.	Face-to-Face: Students work in the special group (Same remedy need group) on tasks to remedy their learning need.
	v. STS Seminar	60minutes	Seminar: Teacher allows two or three resource persons to make presentations on STS based on the NTS. Tutor then guides student teachers through problem-based learning on National Teacher's Standards and reflection on observations made during STS	Seminar: Student teachers listen to various presentations. Student teachers then discuss observations made during STS based on the National Teacher's Standards, reflect and provide a checklist of lessons learned and problems identified and how they can be addressed. Student teachers then provide a reflection report on STS
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 for learning: Student teachers make presentations during group work and model work presentation NTS 3e: Employs a variety of instructional strategies that encourages student participation and critical thinking. Assessment as learning: Student teachers work in groups on remedial tutoring NTS 3j: Produces and uses a variety of teaching and learning resources including ICT, to enhance learning. 			
Teaching Learning Resources	Cardboards, Course manual, Poster paper			

Required Text (core)	NaCCA, Ministry of Education (2019). <i>Science Curriculum for Primary Schools (B4-B6)</i> . Accra: Ministry of Education 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	12 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	The Solar System II				Lesson Duration	3 Hours	
Lesson description	In this lesson, Tutor discusses the relative positions of the sun, moon and the earth with Student teachers. Mainly, the Sun and the collection of all of its companions that travel through space together along with it. There are a variety of objects in the Solar System. Student teachers will look at the Movement of the moon around the earth and the Relative positions of the sun, moon and the earth. The following assessment modes will be used: examination, tests, project work, class assignments and presentations, and portfolio.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers are conversant with the planet Earth, movement of the earth round the sun resulting in day and night.						
Possible barriers to learning in the lesson	Student-teachers may: <ul style="list-style-type: none"> • Have misconception of which one is stationary; the Earth or the Sun. • Not have the skills in teaching the relative motions among the Earth, the Moon and the Sun. 						
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, Tutor and student teachers’</p> <p>Practical Activity: Modelling, Concept Mapping and Cartooning, manipulations.</p> <p>Independent Study: Tutor and student teacher reflections (individually and collectively) and inquiry</p> <p>e-learning Opportunities: OERs and Video presentations</p> <p>Seminar: Presentations on STS progress and discussions</p> <ul style="list-style-type: none"> • Use charts and digital content to describe the various components of the solar system. • Brainstorm to explain the following terms: Star, Galaxy, and the Milky way • Outline the relationship between the Sun and the Earth in the galaxy. • Demonstrate the relative motions among the Earth, the Moon and the Sun 						
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	<p>The student teachers will</p> <ul style="list-style-type: none"> • gain an understanding of the motion of bodies in the solar system. • Understand that the Sun is stationary with all other bodies moving round it. 						
Write in full aspects of the NTS addressed	<p>National Teachers’ Standards: The teacher;</p> <p>1a) Critically and collectively reflects to improve teaching and learning.</p> <p>1c) Demonstrates effective growing leadership qualities in the classroom and wider school.</p> <p>2c) Has secured content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in.</p> <p>3e) Employs a variety of instructional strategies that encourages student participation and critical thinking.</p>						
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		
Learning indicators for each learning outcome	<ul style="list-style-type: none"> • Describe what the Sun, Moon and Earth are composed of. (NTS 1c, 2c). • Describe the relative positions of the Sun, the Moon and the Earth (NTS 1a) 		<p>The student teachers</p> <ul style="list-style-type: none"> • Construct the relative positions of the Sun, the Moon and the Earth, • Discuss the 		<p>Demonstrate knowledge and understanding of the development of the planetary system</p> <p>Use appropriate pedagogies to teach earth minerals and rock types.</p>		

	<ul style="list-style-type: none"> Describe movement of the Moon round the Earth (NTS 2c, 3e) 		<p>movement of the Moon around the Earth and the Earth around the Sun using balloon globe and a touch light.</p>	
Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
The Solar System II B4.3.2.1.1 B5.3.2.1.1	i. Relative positions of the Sun, the Moon and the Earth	90 minutes	Face-to-face: Tutor <ul style="list-style-type: none"> Discusses the approximate relative size of the Sun and the Earth and their Use open-ended questions and shower thoughts to explain relative positions of the Sun, the Moon and the Earth Discuss the relative positions of the sun, moon and the earth. Example 1: How do the relative positions of Earth, the moon, and sun cause the phases, tides, and eclipses, and determine time on Earth? Example 2: One rotation of the Earth takes 24 hours, one revolution around the sun takes 365.25 days 	Face-to-face: Students do <ul style="list-style-type: none"> Video presentation on the solar system to facilitate the relative positions of the sun, moon and the earth. Simulations and multimedia presentations on the relative positions the 3 bodies resulting in various types of eclipse. Multimedia presentation to show relative positions of the Sun, moon and earth Students research individual planets in groups.
	ii. Movement of the moon around the earth	60 minutes	Face-to-face: Tutor <ul style="list-style-type: none"> use open-ended questions and shower thoughts to explain movement of the moon around the earth Discuss the movement of the moon. For example, the Moon moves around the Earth in an approximately circular orbit, going once around us in approximately 27.3 days, or one sidereal period of revolution	<ul style="list-style-type: none"> Face-to-face: students undertake video presentation on the solar system to facilitate movement of the moon around the earth Simulations and multimedia presentations (using ibox) on the movement of moon around the earth Multimedia presentation to show the movement of the moon around the earth
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. By practicing with solar system and the benefits such as day & night, student-teachers' difficulties of linking the concept will be addressed.			

Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> • Assessment as learning: Student teachers’ explain that the first letter of each word in that acronym represents the name of a planet in relation to the sun. NTS 3e: Employs a variety of instructional strategies that encourages student participation and critical thinking • Assessment for learning: Student teachers to complete the worksheet Our Solar System with a partner. NTS 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. • Assessment of learning: Student teachers doing short presentations (3-5 minutes each) on how to teach Our Solar System (Reflection on presentations). NTS 1a: Critically and collectively reflects to improve teaching and learning. NTS 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. <p>Support: Ask students to draw and colour a picture of the solar system. This will enable students to visualize the position of the planets in relation to the sun. Have them label the names of the planets using the <i>My Very Eye May Just Seen Under Nine Planets</i> acronym.</p>
Teaching Learning Resources	Balloon globe, balls of various sizes, touch light. https://www.education.com/activity/article/solar-system-kids/ https://www.education.com/activity/article/solar-eclipse/ https://www.youtube.com/watch?v=82p-DYgGFjI
Required Text (core)	NaCCA, Ministry of Education (2019). <i>Science Curriculum for Primary Schools (B4-B6)</i> . Accra: Ministry of Education. 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	<ul style="list-style-type: none"> • Practicing how to improvise, run PhEt simulations, set relevant demonstrations. • Practicing how to analyse the relative motions among the sun, moon and the earth accurately/correctly. • Tolerating others in group work.

Lesson 8

Year of B.Ed.	2	Semester	2	Place of lesson in semester	12 3 4 5 6 7 8 9 10 11 12		
Title of Lesson	The Solar System III			Lesson Duration	3 Hours		
Lesson description	In this lesson, Tutor discusses Luminous and non-luminous bodies in general with Student teachers. Student teachers will look at the properties of Luminous and non-luminous bodies, Satellites and uses of satellites. The following assessment modes will be used: examination, tests, project work, class assignments and presentations and portfolio.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers are conversant with <ul style="list-style-type: none"> the planet Earth, movement of the earth round the sun resulting in day and night. The popularity of digital TV in Ghana 						
Possible barriers to learning in the lesson	Student-teachers may: <ul style="list-style-type: none"> Have misconception of the Earth spinning on its axis and moving round the sun. Not have the skills in teaching satellite systems 						
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to-face ✓	Practical Activity ✓	Work-Based Learning	Seminars	Independent Study ✓	e-learning opportunities ✓	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to Face: Discussion, Tutor and student teachers’ 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"> Use charts and digital content to describe the various components of the solar system. Brainstorm to explain the following terms: Luminous and non-luminous bodies and Satellites Outline the benefits of Satellites in our daily life. List various uses of Satellites. 						
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	The student teachers will <ul style="list-style-type: none"> gain an understanding of the motion of bodies in the satellites around the Earth is significant for development. distinguish between luminous and non-luminous bodies. distinguish between natural and artificial satellites. state the uses of artificial satellites. National Teachers’ Standards: The teacher; 1a) Critically and collectively reflects to improve teaching and learning. 1c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 3l) Listens to learners and gives constructive feedback.						
Write in full aspects of the NTS addressed							
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	
Learning indicators for each learning outcome							
	<ul style="list-style-type: none"> Describe what luminous and non-luminous bodies are. (NTS 1c, 3l; NTECF p.29). Explain the term satellite. (NTS 1a) 			The student teachers <ul style="list-style-type: none"> Describe luminous and non-luminous bodies, Discuss the natural and artificial satellites. 		Demonstrate knowledge and understanding of the development of the planetary system	

	<ul style="list-style-type: none"> Distinguish between natural and artificial satellites. (NTS 1a, 3l) State the uses of artificial satellites. (NTS 1c, 3e) 		<ul style="list-style-type: none"> State the uses of artificial satellites. 	Use appropriate pedagogies to teach earth minerals and rock types. Apply relevant ICT tools in teaching air masses, atmospheric and oceanic circulation
Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
The Solar System III B6.3.2.1.1	Luminous and non-luminous bodies	60 minutes	Face-to-face: Tutor <ul style="list-style-type: none"> Defines Luminous and Non Luminous Objects: for example Light is a form of energy emitted by bodies under certain conditions. A luminous body is one that emits its own light (example- sun). Non luminous bodies are objects that reflect light from luminous bodies. (example- moon) Discusses the uses of Luminous and non-luminous bodies 	Face-to-face: Student teachers <ul style="list-style-type: none"> use variety of teaching and learning resources such as videos and documentary on models satellites from YouTube Brainstorm student teachers to come out with the meaning of Luminous and non-luminous bodies use charts and digital content to describe the various types of bodies.
	Satellites	60 minutes	Face-to-face: Tutor <ul style="list-style-type: none"> Defines satellite as an artificial (man-made) object which has been intentionally placed into orbit. Distinguishes artificial satellites from natural satellites such as Earth's Moon. Discusses the uses of satellite, for example, for Television, Telephones, Navigation, Business & Finance, Weather Climate and, Environmental Monitoring, Safety, Development, Space Science. 	Face-to-face: Student teachers <ul style="list-style-type: none"> use variety of teaching and learning resources such as videos and documentary on models satellites from YouTube Brainstorm student teachers to come out with the meaning of satellite and use video/simulation illustrate how satellites and their uses use charts and digital content to describe the various types of satellite.
	Uses of satellites	60 minutes	Face-to-face: Tutor <p>Discusses the uses of satellite, for example, for Television, Telephones, Navigation, Business & Finance, Weather Climate and, Environmental Monitoring, Safety, Development and Space Science.</p>	Face-to-face: Student teachers <ul style="list-style-type: none"> use variety of teaching and learning resources such as videos and documentary on models satellites from YouTube brainstorm to explain the uses of satellites Students research individual benefits of artificial satellites

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 student teachers describe/explain luminous and non-luminous bodies; satellites and uses of satellites. NTS 1c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. • Assessment as learning: Charts produced by student-teachers on the benefits of artificial satellites. NTS 1a: Critically and collectively reflects to improve teaching and learning. • Assessment of learning: Student teachers doing short presentations (3-5 minutes each) on how to teach the solar systems and the satellites. NTS 3l: Listens to learners and gives constructive feedback.
Teaching Learning Resources	Balloon globe, touch light, orange, football, tennis ball, the internet, PhEt simulations https://www.education.com/activity/article/ https://www.quora.com/What-is-a-moon-a-luminous-body-or-a-non-luminous-body https://www.youtube.com/watch?v=ebv7Qnr7csQ
Required Text (core)	NaCCA, Ministry of Education (2019). <i>Science Curriculum for Primary Schools (B4-B6)</i> . Accra: Ministry of Education. 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 improvise, run PhEt simulations, set relevant demonstrations. Practicing how to describe/explain luminous and non-luminous bodies

Lesson 9

Year of B.Ed.	2	Semester	2	Place of lesson in semester	12 3 4 5 6 7 8 9 10 11 12		
Title of Lesson	Mixtures 1			Lesson Duration	3 Hours		
Lesson description	In this lesson, Tutor discusses Mixtures with student teachers. Concept of mixtures and types of mixtures (solid-solid, liquid-liquid, liquid-solid, gas-gas, liquid-gas, and solid-gas) are the areas that will be considered. This lesson will enable student teachers to recognise that a mixture is formed when two or more substances are combined such that each substance retains its own chemical identity. Again, this lesson will make them realise many examples of mixtures in their environment, especially their homes and school compound. (NTS, 3e), (NTS, 2c).						
Previous student teacher knowledge, prior learning (assumed)	Student teachers have been introduced to the particulate nature of matter and so are aware that particles bond in several ways to each other. Therefore, these particles can be separated.						
Possible barriers to learning in the lesson	Student teachers may not be able to comprehend the concept of separation and so may have misconceptions about matter.						
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.	Face-to-face: Discussion, demonstration, talk for learning Practical activity: Hands-on activity, observation e-learning opportunity: video presentation						
<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"> Find out student teachers' misconceptions about 'mixtures' Discuss scientific meaning of a 'mixture' Mention examples of mixtures in the environment, especially their homes and school compound <p>National Teachers' Standards: The teacher; 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 3e: Employs a variety of instructional strategies that encourages student participation and critical thinking.</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.		
	i. Identify student teachers' conceptions of mixtures (NTS 3e)		<ul style="list-style-type: none"> Brainstorming to unearth students' conceptions about mixtures 		Share ideas in class to develop communicative, mutual respect, collaborative skills and appreciate individual differences in mixed-ability small and whole class discussions		
	ii. Show videos of mixtures to students to tease out (self-constructed) the scientific description of a mixture (NTS 3e)		<ul style="list-style-type: none"> Show simulations of the formation of mixtures PD Theme 1, pg. 44; PD Theme 4, pg. 112 Analysis and reflections on video presentations on types of mixtures 				
	iii. Types of mixtures (NTS 2c)						

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 Mixtures I B4.1.2.2.1 B5.1.2.3.1	Concept of mixtures	90 minutes	i. Face-to-face/Brainstorming: Tutor allows student teachers to brainstorm in groups of mixed abilities to unearth their conceptions about mixtures PD Theme 4, pg. 23-30 ii. e-learning: Tutor presents videos on the formation of mixtures to the concept	i. Face-to-face: Student teachers discuss their own concepts about mixtures in order to identify their misconceptions ii. e-learning: Student teachers in groups (mixed) brainstorm affably and reflect on video presentations PD Theme 4, pg. 35-46
	Types of mixtures: Solid-solid, liquid-liquid, liquid-solid, gas-gas, liquid-gas, and solid-gas	90 minutes	i. Practical activity/E-learning Tutor engages student teachers in reflective analysis of types of mixtures ii. Tutor engages class in identification of given types of mixtures	i. Practical activity/e-learning Student teachers engage in analytical and reflective discussions on video presentations of types of mixtures ii. In mixed groups, student teachers identify types of mixtures
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 can be ensured.			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Assessment of learning: Student teachers show reflective-constructed notes on the concept and types of mixtures 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 3e: Employs a variety of instructional strategies that encourages student participation and critical thinking. 			
Teaching Learning Resources	Projector, pens, papers, computer, projector (if available)			
Required Text (core)	NaCCA, Ministry of Education (2019). <i>Science Curriculum for Primary Schools (B4-B6)</i> . Accra: Ministry of Education Science Syllabus for Upper Primary Science; Handbook for PD Coordinators Themes 1- 10			
CPD Requirement	Workshop on how to practice honesty and accuracy in compiling/documenting what has been done by a student teacher.			

Lesson 10

Year of B.Ed.	2	Semester	1	Place of lesson in semester	12 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Mixtures II				Lesson Duration	3 Hours	
Lesson description	In this lesson, Tutor discusses Mixtures II with student teachers. The concept of separation of different types of mixtures and industrial separation techniques are the areas that will be considered. This lesson will enable student teachers to recognise that the individual substances in a mixture can be separated using different methods, depending on the type of mixture. This will allow them to appreciate that filtration, evaporation and distillation that they do at home are all methods of separation mixtures. (NTS, 2c). (NTS, 3e)						
	Student teachers have learnt about the concept and different types of mixtures as well as the basis for their classifications.						
Possible barriers to learning in the lesson	Misconceptions about 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, Demonstration Practical activities: Hands on activities e-learning opportunities: Computer simulations.						
<ul style="list-style-type: none"> Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. Write in full aspects of the NTS addressed 	<ul style="list-style-type: none"> Ascertain the level of student teachers' understanding of the concept of mixtures and correct any misconceptions Introduce student teachers to simple separation activities Instil the attributes of accuracy, carefulness, honesty, long-suffering and tolerance into student-teachers <p>National Teachers' Standards: The teacher; 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 3e) Employs a variety of instructional strategies that encourages student participation and critical thinking.</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 cross-cutting issues, core and transferable skills, inclusivity, equity and address diversity. How will these be developed	
	<ul style="list-style-type: none"> Brain storm to identify alternative conceptions about the terms 'separation' and 'mixtures' (NTS 2c, 3e) Correct misconception/misinformation Be able to design appropriate methods for separating mixtures encountered in everyday activities (NTS 2c, 3e) 		<ul style="list-style-type: none"> Make a list of likely conceptions about separation of mixtures Present design models that can link possible misconceptions to new insights Provide a reflection activity laboratory report on the separation of given mixtures Provide evidence of local technologies of separation encountered in household kitchen and indigenous/local industries 			Communication and through whole class discussion Creativity and critical thinking are developed in developing models Equity, collaboration and Reflection are developed from reflective activities	

	<ul style="list-style-type: none"> Video presentations on other separation techniques not available in school 	<ul style="list-style-type: none"> Provide opportunity for student-teachers to see other complex separation processes 	Reflection on video presentation
Content of lesson picked and developed from the course specification	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study
Topic Title			Teacher Activity Facilitate and provide the necessary tool for students' activities.
Teaching Mixtures II B6.1.2.2.1	The concept of separation of different types of mixtures, using local examples	60 minutes	<ul style="list-style-type: none"> Brainstorm with student teachers to find out simple separation processes in one's communities The groups are provided with common mixtures in the community to separate Based upon separation activities groups classify the different types of mixtures
	Hands-on separation activities	90 minutes	<ul style="list-style-type: none"> Group class into mixed abilities to devise appropriate methods for separating mixtures encountered in everyday activities
	Analytical discussion on industrial separation techniques	30 minutes	<ul style="list-style-type: none"> Small group and whole group discussions on observed separation methods
Which cross cutting issues will be addressed or developed and how	Equity and SEN: through mixed and same group work to establish an interactive and inclusive classroom atmosphere. Through group work discussions and collaboration good attitudinal skills are developed		
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> Student-teacher presentations during group work and practical activities (Presentations to last for 3-5mins for each group) 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. Assessment of learning: Student teachers work in groups and contribute towards discussion to show their depth of comprehension 3e) Employs a variety of instructional strategies that encourages student participation and critical thinking. 		
Teaching Learning Resources	Science Syllabus, Water, Sand, Salt, microscience or standard laboratory equipment, computer, projector (if available)		
Required Text (core)	NaCCA, Ministry of Education (2019). <i>Science Curriculum for Primary Schools (B4-B6)</i> . Accra: Ministry of Education.		

	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. Ltd; 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 preparation of checklist and Reflection guides

Lesson 11

Year of B.Ed.	2	Semester	1	Place of lesson in semester	12 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Upper Primary Integrated Science Curriculum			Lesson Duration	3 Hours		
Lesson description	In this lesson the student teachers is introduced to the key features of the upper primary integrated science syllabus such as transitional and age-specific requirements. These will ensure that different abilities and strengths/needs are catered for to ensure a safe working environment and equal opportunities for all learners.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers were introduced to the integrated science course (SCE 121) in Level 100.						
Possible barriers to learning in the lesson	Student teachers might have forgotten about the basic features of a science curriculum.						
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.	Face-to-face: Discussion, Demonstration Student teachers critically review the organisation of the upper primary integrated science curriculum as well as its implication for integrated science teaching and learning, and demonstrate significant ability to design and engage in Micro Science (MS) practical activities and other alternative interactive assessment practices. (NTS 1f, NTS 2d, 2e)						
<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"> To introduce and acquaint student teachers with the key features of the upper primary integrated science curriculum, especially those that would enable transition from early childhood (B3) to middle childhood (Upper Primary). It is also to emphasise issues such as transitional and age-specific requirements (ensure that different abilities and strengths/needs are catered for to ensure a safe working environment and equal opportunities). National Teachers’ Standards: The teacher: 1f) Develops a positive teacher identity and acts as a good role model for students 2d) At pre-primary and primary the teacher knows the curriculum for the years appropriate to multigrade classes; has good knowledge of how to teach 2e) Understands how children develop and learn in diverse contexts and applies this in their teaching						
<ul style="list-style-type: none"> Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome 	Learning Outcomes		Learning Indicators		Identify which cross-cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity.		
	Critically review organisation of the upper primary integrated science curriculum as well as its implication for integrated science teaching and learning, and demonstrate significant ability to design and engage in Micro Science (MS) practical activities and other alternative interactive assessment practices. (NTS 1f, 2d, 2e)		<ul style="list-style-type: none"> Provide a report to show a clear evidence of understanding of the components of the upper primary integrated science curriculum. Produce a lesson plan based on the content of the teaching syllabus for integrated science for upper primary 		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
Upper Primary Integrated Science Curriculum	Key features of the Upper Primary Integrated Science Curriculum	180 minutes	i. Face-to-face: Tutor allows student teachers in groups of mixed abilities to peruse the science curriculum and present power point on key features PD Theme 4, pg. 23-30	i. E-learning: Student teachers in groups of mixed abilities make power point presentations on key features of the science curriculum PD Theme 4, pg. 35-46 ii. Develop a mini MS activity model for pupils' use from the curriculum
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 for learning: Student teachers show power point presentation on building portfolio NTS 1f: Develops a positive teacher identity and acts as a good role model for students NTS 2d: At pre-primary and primary the teacher knows the curriculum for the years appropriate to multigrade classes; has good knowledge of how to teach NTS 2e: Understands how children develop and learn in diverse contexts and applies this in their teaching 			
Teaching Learning Resources	Upper Primary Science Curriculum, projector, pens and papers.			
Required Text (core)	Upper Primary Science Curriculum; Handbook for PD Coordinators Themes 1- 10			
CPD Requirement	Workshop on the Upper Primary Science Curriculum for critical examination, analysis and reflection by student teachers.			

Lesson 12

Year of B.Ed.	2	Semester	1	Place of lesson in semester	12 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	COURSE REVIEW II and STS Seminar			Lesson Duration	3 Hours		
Lesson description	The review and audit the lessons for the second 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)	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	Seminar	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: Mixed group discussions and demonstrations and playing games. Practical Activity: drawing, Manipulating Independent study and e-learning opportunities: Video simulations and presentations, Khan academy resource and various OERs, inquiry/reflections.						
<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>National Teachers’ Standards: The teacher: 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 3e) Employs a variety of instructional strategies that encourages student participation and critical thinking.</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 (NTC 2c, 3e) Be able to reflect on lessons learnt so far and state new insights and/or grey areas needing remedies (NTC 2c, 3e) Correct misconception/misinformation for earlier (lesson 1 – 5) lessons (NTC 2c, 3e) 		<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 PD Theme 3, pg 63 – 81 		Collaborations, Communication and Research: Through group work and presentation PD Theme 4, pg. 23-30 Equity and Reflection is developed from reflective activities Creativity and critical thinking are developed in creating models and concept maps PD Theme 5, pg 37		

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
Course Review II	Reviewing the understanding of the lessons The Solar System II, The Solar System III, Mixtures I, Mixtures II and Upper Primary Integrated Science Curriculum (NTS 2c)	30minutes	<ul style="list-style-type: none"> Face-to-face: Brainstorming with student – teachers to initiate the weaknesses and strengths of student – teachers in the lessons 1 – 5. 	<ul style="list-style-type: none"> Face-to-face: Student – Teachers responds to Tutor questions on weaknesses and strengths
		30minutes	<ul style="list-style-type: none"> Face-to-Face: 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 	<ul style="list-style-type: none"> Face-to-Face: Working in groups and with the checklist student teachers identify and record all possible weaknesses and strengths in the lessons learnt so far.
	Remedies to course topics (NTS 3e)	60minutes	Face-to-face: Group student teachers according to remedy need and provide specific task assistance in the areas on concept needing remedy.	Face-to-face: Students work in the special group (Same remedy need group) on tasks to remedy their learning need. PD Theme 3, pg. 121; PD Theme 5, pg. 33.
	STS Seminar	60minutes	Seminar: Teacher allows two or three resource persons to make presentations on STS based on the NTS. Tutor then guides student teachers through problem-based learning on National Teacher’s Standards and reflection on observations made during STS.	Seminar: Student teachers listen to various presentations. Student teachers then discuss observations made during STS based on the National Teacher’s Standards, reflect and provide a checklist of lessons learned and problems identified and how they can be addressed. Student teachers then provide a reflection report on STS

Which cross cutting issues will be addressed or developed and how	Equity and SEN: through mixed and same ability group work to protect vulnerable students. Student teachers establish an interactive and inclusive learning environment through group work. Reflections to improve critical thinking.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ul style="list-style-type: none"> • Assessment for learning: Student teachers present group work and model work on the Solar System II, Solar System III, Mixtures I, Mixtures II and Upper Primary Integrated Science Curriculum NTS 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. • Assessment for learning: Student teachers working in groups on remedies to course topics NTS 3e: Employs a variety of instructional strategies that encourages student participation and critical thinking.
Teaching Learning Resources	Cardboards, computer with internet access, smart phone, tablets, Models, charts and pictorials.
Required Text (core)	NaCCA, Ministry of Education (2019). <i>Science Curriculum for Primary Schools (B4-B6)</i> . Accra: Ministry of Education 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. Handbook for PD Coordinators Themes 1- 10 Family Life and Sexual Health –High School version, lesson 2: Reproductive Systems; Public Health-Seattle & King County, Revised 2011. www.kingcounty.gov/health/flash
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.
CPD Requirement	Training in Developing Learning Materials and using OERs for learning

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