

**YEAR 2**

**SEMESTER 1**

# Four-Year B.Ed. Course Manual

# INTEGRATED SCIENCE I





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Transforming Teaching, Education & Learning



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# FOREWORD

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

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

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

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

**Professor Mohammed Salifu Director General, Ghana Tertiary Education Commission**

## ACKNOWLEDGEMENTS

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

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

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

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

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

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

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# INTRODUCTION TO COURSE MANUALS

Welcome to this B.Ed. Course manual.

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

The manuals serve the following purposes:

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

Specifically, they also:

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

Who are course manuals for:

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

## USING THIS MANUAL

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

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

My teaching philosophy is .....

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

## A.Course Information

### Integrated Science for Upper Primary 1

#### 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

<b>Course Name</b>	<b>Integrated Science for Upper Primary II</b>
<b>Pre-requisite</b>	<b>Introduction to Integrated Science I and Introduction to Integrated Science II (from year 1)</b>
<b>Course Level</b>	<b>200</b>
<b>Course Code</b>	
<b>Credit Value</b>	<b>3</b>

#### 1. Goal for the Subject or Learning Area

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

#### 2. Course Description

The course for semester one of year two uses the universal design for learning approach to extend the basic science concepts of the student teacher on the following content areas: groups of plants, groups of animals, metals, non-metals and rusting, measurement of temperature, ventilation and psychology of early adolescent learner and science teaching and learning. 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 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 classification of plants and animals at the primary level (NTS 1b, 1d, 1g, p12: 2c, p.13 & 21)

CLO2. Develop creative learning activities that can make the primary school learner distinguish between metals and non-metals (NTS 1b, 1d, 1g, p12: 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 1b, 1d, 1g, p12:2c, p.13 & 21),

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

#### 6. Learning Indicators

- Develop science related games children can play and learn about plant and animal uses.

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

- Present a mini project work on the conception of metals, non-metals and rusting in the immediate environment.

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

CLO 5. 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"> <li>Prepare a reflective report on observations during STS for a seminar</li> </ul>		
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, 1d p14 & 18, 14: 3e, 3j, p14)	<ul style="list-style-type: none"> <li>Provide a checklist to identify beginning teacher behaviour and attitudes that meets the NTS and a documentary of positive values, attitudes and relevant laws that protect the learner for peer review exercise</li> </ul>		
<b>7. Course Content</b>			
Unit (Week)	Topic	Subtopic (if any)	Teaching and learning activity to achieve the learning outcomes
Week 1	<ul style="list-style-type: none"> <li>Review of Year 1 integrated science</li> </ul>	<ul style="list-style-type: none"> <li>Introducing the course manual for the JHS specialism</li> <li>Recap of year 1 lessons and challenges thereof.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrations and discussions</li> <li>Reflections, presentations and designing</li> <li>Role playing/song creations</li> <li>Simulations, video and Computer presentation</li> <li>Produce charts and illustrations of forms and sources of energy</li> </ul>
	<ul style="list-style-type: none"> <li>Groups of Plants</li> </ul>	<ul style="list-style-type: none"> <li>Group of plants: erect, creeping and climbing</li> <li>Root systems of plants</li> <li>Characteristics of leaves, and stem and Uses of plants</li> </ul>	
Week 2	Groups of Animals	<ul style="list-style-type: none"> <li>Grouping of animals based on movement and living space</li> <li>Body covering of animals</li> <li>Uses of some animals, pets and care of pets</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrations and group discussions</li> <li>Reflections, presentations and designing/game development</li> <li>Concept mapping</li> <li>iv. Simulations, video and Computer presentation</li> </ul>
Week 3	Metals and Non-Metals	<ul style="list-style-type: none"> <li>Types of Materials</li> <li>Classification of materials into metals and non-metals</li> <li>Characteristics of metals and non-metals</li> </ul>	<p><b>Face-to Face:</b> Discussion, Role Playing, Construction of games, Designing rhymes, creating songs about plants and animals</p> <p><b>e-learning:</b> Video and Computer simulation on teaching activities and assessment strategies.</p>
Week 4	Rusting	<ul style="list-style-type: none"> <li>Meaning of Rust</li> <li>Causes, effects and cleaning of rust from surface of iron and methods of preventing rust: painting, oiling or greasing; insulating the surface of iron from air</li> </ul>	<p><b>Face-to-face:</b> Mixed group discussions and demonstrations/role plays, Concept Mapping and Cartooning.</p> <p><b>e-learning/Reflections:</b> Video presentations from MOOCs with reflections on values such as Honesty, Accuracy, Precision and critical thinking.</p>
Week 5	Measurement in science	<p>i. <b>Temperature:</b> Meaning of temperature and units of temperature, reading temperature on analogue and digital thermometers, handling and using thermometers</p>	<p><b>Face-to-face:</b> 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,</p> <p><b>e-learning opportunities:</b> multimedia presentations, problem-based teaching,</p> <p><b>e-learning opportunities:</b> multimedia presentations</p>

Week 6)	Misconceptions about measurement in science	<ul style="list-style-type: none"> <li>Misconceptions about temperature, physical measure (Area/volume of plane figures, Mass/weight)</li> </ul>	<b>Face-to-face:</b> Discussion, Talk for learning approaches with student teacher presentations,
Week 7	Course Review I and STS Seminar	<ul style="list-style-type: none"> <li>Reviewing and reflecting on lessons 1-6</li> <li>STS Seminar</li> </ul>	<b>Face-to-Face:</b> Pyramid discussions, Presentations <b>e-learning:</b> OERs and MOOCs <b>Independent Study:</b> reflection on observations made during STS and problem-based learning: on National Teacher's Standards
Week 8	Ventilation I	<ul style="list-style-type: none"> <li>Meaning of convection</li> <li>Convection Currents</li> </ul>	Face-to-face discussions, demonstration, mixed group work Computer simulations and OERs sources
Week 9	Ventilation II	<ul style="list-style-type: none"> <li>Ventilation and Convection Currents</li> <li>Applications of convection (sea breeze, land breeze, air conditioning, fridge, chimney and ventilation of rooms) and causes of poor ventilation</li> </ul>	Independent Study: Inquiry and reflections <b>Face-to-Face:</b> Discussions, Role playing and Rhyme designing
Week 10	Psychology of Early Adolescent Learner and Science Teaching and Learning I	<ul style="list-style-type: none"> <li>The Adolescent Learner adapting to Science learning</li> </ul>	<b>Face-to-Face:</b> Think, Pair, Share, Share discussions, Reflections and rhyming e-learning: OERs and MOOCs with report writing
Week 11	Psychology of Early Adolescent Learner and Science Teaching and Learning II	<ul style="list-style-type: none"> <li>The Adolescent Learner in and inclusive science classroom</li> </ul>	<b>Face-to-Face:</b> Modelling, Role playing and developing games.
Week 12	Course Review II with STS seminar	<ul style="list-style-type: none"> <li>Reviewing and reflecting on lessons 8-11</li> <li>STS Seminar</li> </ul>	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: Exams 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, accuracy, numeracy, writing and reading

Weighting: 40%

CLO4, CLO5 AND CLO6

NTS:

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

<p>1d) Is guided by legal and ethical teacher codes of conduct in his or her development as a professional teacher.</p> <p>1g) Sees his or her role as a potential agent of change in the school, community and country</p> <p>2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes</p> <p>2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in.</p> <p>3e) Employs a variety of instructional strategies that encourages student participation and critical thinking.</p> <p>3i) Explains concepts clearly using examples familiar to students.</p> <p>3j) Produces and uses a variety of teaching and learning resources including ICT, to enhance learning</p>
<p><b>Component 2: Subject Project (30% overall Semester score)</b></p> <ul style="list-style-type: none"> <li>• <b>Introduction; a clear statement of aim and purpose of the project -10%</b></li> <li>• <b>Methodology; What the student teacher has done and why to achieve the purpose of the project – 20%</b></li> <li>• <b>Substantive/Main section of the work – 40%</b></li> <li>• <b>Conclusion – 30%</b></li> </ul> <p>CLO1, CLO 2, CLO3, CLO5 AND CLO6</p> <p>NTS:</p> <p>1b) Improves personal and professional development through lifelong learning and Continuous Professional Development.</p> <p>1d) Is guided by legal and ethical teacher codes of conduct in his or her development as a professional teacher.</p> <p>1g) Sees his or her role as a potential agent of change in the school, community and country</p> <p>2c) Has secure 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>3j) Produces and uses a variety of teaching and learning resources including ICT, to enhance learning</p>
<p><b>Component 3: End of Semester Examination – (40% overall Semester Assessment)</b></p> <p><b>Component 3: Assessment as Learning (Review of Reports)</b></p> <p>Summary of Assessment Method: Peer Review / Evidence of report from school visits for portfolio/ Reflective notes</p> <p>Core skills to be acquired: Pedagogical, observational and cooperative skills</p> <p><del>Weighting: 30%</del></p> <p>CLO1-CLO6</p> <p>NTS:</p> <p>1b) Improves personal and professional development through lifelong learning and Continuous Professional Development.</p> <p>2c) Has secure 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>3j) Produces and uses a variety of teaching and learning resources including ICT, to enhance learning</p>
<p><b>9. Required Reading and Reference List</b></p>
<p>NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra.</p> <p>Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., &amp;Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i>. Accra: Unimax MacMillan.</p> <p>Abbey, T. K., &amp;Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i>. Accra: Unimax Macmillan.</p> <p>Ameyibor, K., &amp;Wiredu, M. B. (2006). <i>Ghana association of science teachers' chemistry for senior high schools</i>. Accra: Unimax MacMillan.</p> <p>Asabere-Ameyaw, A., &amp;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.&amp;Obeng-Ofori, D. (2011). <i>SWL integrated science for senior high schools: Students book</i>. Accra, Ghana; Sam-Woode Ltd.</p>
<p><b>10. Teaching and Learning resources</b></p>
<p>Copies of Year two Semester two course manuals for the specialism, Smartphones, Tablets, Productivity tools (software that allow teachers to work better), Subject based instructional tools/applications, Instructional laboratories, Smart boards,</p>

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

<b>Year of B.Ed.</b>	2	<b>Semester</b>	1	<b>Place of lesson in semester</b>	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Group of Plants	Lesson Duration	3				
<b>Lesson description</b>	<p>This lesson reviews the year 1 integrated science course and introduces this course manual with the view to help the student teacher transition into the upper primary science specialism. Also, the lesson will deepen the understanding of the basic concepts of group of plants and animals and classification of plants using their characteristics. The lesson will expose them to teaching strategies and material so that they will effectively handle similar topics in their future science classrooms. The student teacher will also appreciate the relationship between humans and plants.</p> <p>This first lesson introduces student teachers to the course learning outcomes and the three assessment components of the course</p>						
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Student teachers studied aspects of plants in senior high school integrated science course						
<b>Possible barriers to learning in the lesson</b>	The season of the year may affect the availability of common plant species in the environment. However pictures obtained from the internet can be used as substitute						
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face</b> √	<b>Practical Activity</b>	<b>Work-Based Learning</b>	<b>Seminars</b> √	<b>Independent Study</b> √	<b>e-learning opportunities</b> √	<b>Practicum</b>
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	Face-to-Face: Discussion, concept maps, Talk for learning approaches, nature walk and observation, jigsaw puzzles and presentations						
<ul style="list-style-type: none"> <li><b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b></li> <li><b>Write in full aspects of the NTS addressed</b></li> </ul>	<ul style="list-style-type: none"> <li>Student teachers deepen their knowledge on groups of plants</li> <li>Help the student teacher to be able to classify/group plants species using their characteristics</li> <li>Equip the student teacher with appropriate pedagogic skills to handle the topic in his future class</li> <li>Provide student teacher an understanding and appreciation of plants in the environment</li> </ul> <p>NTS: The teacher: 1a: Critically and collectively reflects to improve teaching and learning. 1b: Improves personal and professional development through lifelong learning and Continuous Professional Development. 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 2e: Understands how children develop and learn in diverse contexts and applies this in his or her teaching</p>						

<ul style="list-style-type: none"> <li>Learning Outcome for the lesson, picked and developed from the course specification</li> <li>Learning indicators for each learning outcome</li> </ul>	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"> <li>Link concepts in year one to new concepts in groups of plants and animals 1</li> <li>Student teachers to classify plants into erect, creeping and climbing plants based on the nature of their stems</li> <li>Student teachers to classify and describe root system of plants</li> <li>Student teachers to describe characteristics of leaves and stems of plants a</li> <li>The student teacher should be able to discuss the uses of plants</li> </ul>	<ul style="list-style-type: none"> <li>Develop Concept Maps to link concepts from year 1 to new concepts yet to be developed</li> <li>Student teachers develop a Chart on different types of plants based on the nature of their stems</li> <li>Student teachers submit a chart on different types root system of pants with their descriptions</li> <li>Student teachers submit checklists of characteristics of leaves and stems of plants respectively</li> <li>Student teachers present reflective report on the uses of plant.</li> </ul>	<ul style="list-style-type: none"> <li>Develop the skills of construction, aesthetics and critical thinking through identification and classification</li> <li>Develop the skills of construction of charts aesthetics and critical thinking through identification and classification</li> <li>Develop skills of construction of checklist and critical thinking skills through identification of characteristics of leaves and stems of plant</li> <li>Reflection, Communication and Research: Through construction of charts</li> </ul>		
Content of lesson picked and developed from the course specification	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study		
Topic Title			Teacher Activity	Student Activity	
	Introducing the Course Manual for JHS specialism	20 minutes	<b>Face-to-Face:</b> Tutor initiates shower thoughts discussion with student teachers to identify expectations for and introduce new course manual for specialism to student teachers	<b>Face-to-Face:</b> Student teachers respond to discussions, noting their expectations, drawing from their experience with year 1 course manuals and focusing on the specialism for B4-B6 level specialism	
Group of Plants	Recap of year 1 lessons and challenges thereof.	30 minutes	<b>Face-to-face/Group activity:</b> Tutor initiates a Pyramid discussion on the year 1 concepts with student teachers, and encourages them to reflect on the new concepts, the challenges and unique lessons	<b>Face-to-face/Group activity:</b> Student teachers work individually and in groups to discuss year one lessons, the challenges, unique values and produce a concept map of possible expectations in the content of the upper primary science lessons	
	Group of plants: erect, creeping and climbing plants (B4.1.1.1.1, B4.1.1.1.2, B4.2.2.1.1)	40 minutes	<b>Face-to-face/Group activity:</b> Tutor led Nature walk for student teachers to collect different plants for classification.	<b>Face-to-face/Group activity:</b> Student teachers in groups role play and create songs about plants. They discuss, develop and present classification charts of erect, creeping and climbing plants	

	Root system of plants (B4.1.1.1.1, B4.1.1.1.2, B4.2.2.1.1)	<b>40 minutes</b>	<b>Face-to-face/Group activity:</b> Tutor allows Student teachers to collect plants with different root systems from previous nature walk	<b>Face-to-face/Group activity:</b> Student teachers in diverse groups develop, display and discuss their developed classification chart according to the categories of root systems of the plants collected.
	Characteristics of leaves and stems of plants (B4.1.1.1.1, B4.1.1.1.2, B4.2.2.1.1, B6.1.1.1.1)	<b>25 minutes</b>	<b>Face-to-face/Group activity:</b> Tutor to guide student teachers to use Jigsaw puzzle and matching/mapping to sort out and classify different leaves and stems of plants into appropriate categories	<b>Face-to-face/Group activity:</b> Mixed ability /gender based group presentation and discussion of their identification classification of the plant parts
	Uses of plants (B6.1.1.1.1)	<b>25 minutes</b>	<b>Face-to-face/Group activity:</b> Tutor puts student teachers into mixed ability /gender based groups to discuss uses of plants	Mixed ability/gender group to present and discuss their findings on the uses of plants and to demonstrate some of the observed skills Values such as care, sincerity and cross cutting issue like innovation will be learnt through Group work.
<b>Which cross cutting issues will be addressed or developed and how</b>	Equity and SEN: through setting ground rules to protect vulnerable student - Teachers and establishing an interactive and inclusive classroom atmosphere. Through the game of "Tell it", Student – Teachers specific weakness and Strengths will be identified and catered for.			
<b>Lesson assessments – evaluation of learning: of, for and as learning within the lesson</b>	<ul style="list-style-type: none"> <li>Assessment for and as learning: Student teachers to develop charts on groups of plants and also make a presentation of charts on root systems of plants (20 marks)</li> <li>Assessment of learning: student teachers to provide reports on characteristics of leaves, and stems of plants and on the uses of plants. 40 % of total marks for the semester (20 marks)</li> </ul>			
<b>Teaching Learning Resources</b>	The Course Manual, pictures of creeping, climbing and erect plants, collection of root systems of different plants (dicots and monocots) , jigsaw/puzzles on different leaves and stems of plants, Flip Charts, Ball, Pens, Pencils, 'A' 4 sheets, markers			
<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.			
<b>Additional Reading List</b>	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.			
<b>CPD Requirement</b>	Training on the use of jigsaw/puzzles, concept maps and how to design learning activities for specific grade levels			
<b>Course Assessment</b>	<sup>1</sup> <b>Component 1: Subject Portfolio Assessment (30% overall score)</b> <ul style="list-style-type: none"> <li>Selected Item of Student work (3 items – 10%) = 30%</li> <li>Midterm assessment – 20%</li> <li>Reflective Journal – 40%</li> <li>Organization of the Subject Portfolio- 10% (How its presented/organized)</li> </ul>			

<sup>1</sup> See rubrics on subject Portfolio Assessment in Annex 6 of NTEAP

	<p><sup>2</sup>Component 2: Subject Project (30% overall Semester score)</p> <ul style="list-style-type: none"><li>• Introduction; a clear statement of aim and purpose of the project -10%</li><li>• Methodology; What the student teacher has done and why to achieve the purpose of the project – 20%</li><li>• Substantive/Main section of the work – 40%</li><li>• Conclusion – 30%</li></ul> <p>Component 3: End of Semester Examination – (40% overall Semester Assessment)</p>
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<sup>2</sup> See rubrics on Subject Project Assessment in Annex 6 of NTEAP

## Lesson 2

<b>Year of B.Ed.</b>	2	<b>Semester</b>	1	<b>Place of lesson in semester</b>	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Group of Plants and Animals II				Lesson Duration	3
<b>Lesson description</b>	In this lesson, the Tutor will assist the student teachers to deepen their understanding of basic concepts of group of plants and animals and classification of animals using their characteristics. The lesson will expose them to teaching strategies and material so that they will effectively handle similar topics in their future science classrooms. The student teacher will also appreciate the relationship between humans and animals.					
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Student teachers have studied aspects of animals in senior high school integrated science					
<b>Possible barriers to learning in the lesson</b>	The season of the year may affect the availability of common animal species in the environment. However pictures obtained from the internet can be used as substitute.					
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face</b> √	<b>Practical Activity</b> √	<b>Work-Based Learning</b>	<b>Seminars</b>	<b>Independent Study</b>	<b>e-learning opportunities</b> √
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	Face-to-Face: Discussion, Talk for learning approaches, nature walk and observation, brainstorming, open-ended questioning techniques and presentations Practical Activity: Manipulating, nature walk and recording					
<ul style="list-style-type: none"> <li><b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b></li> <li><b>Write in full aspects of the NTS addressed</b></li> </ul>	<ul style="list-style-type: none"> <li>Tutor and student teachers to deepen their knowledge on grouping of animals</li> <li>Student teachers to be able to classify/groups of animals based on their body covering and habitats using observation of their characteristics and where they live</li> <li>Student teacher to identify the uses of some animals, pets and care of pets.</li> <li>Equip student teachers with appropriate pedagogic skills to handle the topic in their future class</li> <li>Student teacher develop an appreciation of animals in the environment</li> </ul> <p>NTS: The teacher: 1a: Critically and collectively reflects to improve teaching and learning. 1b: Improves personal and professional development through lifelong learning and Continuous Professional Development. 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 2e: Understands how children develop and learn in diverse contexts and applies this in his or her teaching</p>					
<ul style="list-style-type: none"> <li><b>Learning Outcome for the lesson, picked and developed from the course specification</b></li> <li><b>Learning indicators for each learning outcome</b></li> </ul>	<b>Learning Outcomes</b>		<b>Learning Indicators</b>		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"> <li>Student teachers to classify animals based on different movement, and habitats</li> <li>Student teachers to exhibit knowledge of body covering of animals through observation and discussion</li> </ul>		<ul style="list-style-type: none"> <li>Student teachers submit a chart on grouping of animals based on their different movement, habitats</li> <li>Student teachers present group reports on body covering of animals</li> </ul>		Develop the skills of construction of charts, aesthetics and critical thinking through observation, identification and classification Develop the skills of open-ended questioning, skills of tolerance of different opinions, aesthetics and critical thinking through observation	

	<ul style="list-style-type: none"> <li>Student teachers in inclusive mixed ability groups to brainstorm to come out with uses of animals and pets, and care of pets</li> </ul>		for whole class discussion <ul style="list-style-type: none"> <li>Student teachers should present a report on uses of animals and pets and care of pets for whole class discussion</li> </ul>	Develop skills of brainstorming techniques, report writing and presentation, communication and critical thinking skills
<b>Content of lesson picked and developed from the course specification</b>	<b>Sub Topic</b>	<b>Time Stage</b>	<b>Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study</b>	
<b>Topic Title</b>			<b>Teacher Activity</b>	<b>Student Activity</b>
Group of Animals (B4.1.1.1.1, B4.1.1.1.2, B4.2.2.1.1, B6.1.1.1.1)	Grouping of animals based on movement and living space	60 minutes	<b>Face-to-face/Nature walk:</b> Tutor led Nature walk for student teachers to observe movement and living spaces (habitats)of different animals Tutor guides student teachers in diverse groups to use their observation to put animals into various categories based on their movement and habitats	<b>Face-to-face/Group work:</b> Student teachers in groups develop and present classificatory charts and discuss their charts
	Body covering of Animals	60 minutes	<b>Face-to-face:</b> Tutor uses open-ended questions to elicit student-teachers' knowledge gained through observation and daily experiences with different body covering of animals and uses of the body covering. Allow student teachers to watch short video clips on coverings of animals ( <a href="https://www.youtube.com/watch?v=Yy4RLd8YV6Y">https://www.youtube.com/watch?v=Yy4RLd8YV6Y</a> )	<b>Face-to-face:</b> Student teachers watch short video clips on different animal coverings, summarise and share their reports on the discussion in addition to providing a list of animals with their corresponding body covering and uses of the latter
	Uses of some animals, pets and care of pets	60 minutes	<b>Face-to-face/Group work:</b> Tutor guides student teachers in inclusive/gender groups to brainstorm and come out with uses of animals, and pets and to explore some of the key features of caring for pets including needs of pets	<b>Face-to-face/Group work:</b> Mixed ability/gender group to present and discuss their findings on the uses of animals and pets and caring of pets, to demonstrate some of the observed skills. Values such as care, sincerity and cross cutting issue like innovation will be learnt through group work.

<b>Which cross cutting issues will be addressed or developed and how</b>	ity and SEN: through setting ground rules to protect vulnerable student - Teachers and establishing an interactive and inclusive classroom atmosphere. Through the game of “Tell it”, Student – Teachers specific weakness and Strengths will be identified and catered for.
<b>Lesson assessments – evaluation of learning: of, for and as learning within the lesson</b>	<ul style="list-style-type: none"> <li>• Assessment for learning: Student teachers to provide charts on grouping of animals based their movement and habitats</li> <li>• Assessment as Learning: Student teachers present group reports on their knowledge of body covering of animals and their uses as elicited from group/whole class discussion</li> <li>• Assessment of learning: student teachers to provide group reports on uses of animals and pets and caring of pets. 40 % of total marks for the semester</li> </ul>
<b>Teaching Learning Resources</b>	The Course Manual, pictures of animals in different habitats; pictures from the internet of animals with different body covering, pictures of pets, Flip Charts, Ball, Pens, Pencils, ‘A’ 4 sheets, markers, short video clips from YouTube <a href="https://www.youtube.com/watch?v=Yy4RLd8YV6Y">https://www.youtube.com/watch?v=Yy4RLd8YV6Y</a>
<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.
<b>Additional Reading List</b>	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.
<b>CPD Requirement</b>	Training on observation skills, brainstorming techniques, report writing and how to design Learning activities for specific and inclusive multi-grade classroom

## Lesson 3

<b>Year of B.Ed.</b>	2	<b>Semester</b>	1	<b>Place of lesson in semester</b>	12 <b>3</b> 4 5 6 7 8 9 10 11 12
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<b>Title of Lesson</b>	<b>METALS AND NON-METALS (B4-B6)</b>				<b>Lesson Duration</b>	<b>3</b>	
<b>Lesson description</b>	This lesson is designed to equip the student teacher with requisite pedagogic knowledge, understanding and skills necessary to differentiate between metal and non-metals. The course contents are: types of materials, characteristics of metals and non-metals, uses of metals and non-metals. The course will be delivered using the following methods: Discussion, presentations (group/individual), project work/practical work, demonstrations, brainstorming, and simulation. The following assessment modes will be used: Examination, tests, project work, class assignments and presentations, and portfolio.						
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Student teachers have studied the 3 states of matter and have grouped them into solid, liquid and gas in their first year.						
<b>Possible barriers to learning in the lesson</b>	Most of the first 20 elements in the periodic table can only be found in the compound form and may not be available for observation in the pure form.						
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face</b> <input checked="" type="checkbox"/>	<b>Practical Activity</b> <input checked="" type="checkbox"/>	<b>Work-Based Learning</b>	<b>Seminar</b> <input checked="" type="checkbox"/>	<b>Independent Study</b> <input checked="" type="checkbox"/>	<b>e-learning opportunities</b> <input checked="" type="checkbox"/>	
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	<b>Face-to-Face: Discussion</b> <ul style="list-style-type: none"> <li>Group activity: through simulations and discussion describe the characteristics of metals and non-metals.</li> <li>Role play, watch videos on the first twenty elements of the periodic table and group them into metals and non-metals.</li> <li>Compose songs using some chemical properties of metals and non-metals.</li> <li>Brainstorm and use simulations to distinguish between metals and non-metals</li> </ul>						
<ul style="list-style-type: none"> <li><b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b></li> <li><b>Write in full aspects of the NTS addressed</b></li> </ul>	<ul style="list-style-type: none"> <li>Get the conceptual understanding of metals and non-metals.</li> <li>Discard the common misconceptions that student teachers have on chemical elements.</li> <li>Demonstrate understanding of the importance of metals</li> <li>Designing activities to teach metals and non-metals.</li> </ul> <p>NTS: The teacher: 1a: Critically and collectively reflects to improve teaching and learning. 1b: Improves personal and professional development through lifelong learning and Continuous Professional Development. 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 2e: Understands how children develop and learn in diverse contexts and applies this in his or her teaching</p>						
<ul style="list-style-type: none"> <li><b>Learning Outcome for the lesson, picked and developed from the course specification</b></li> <li><b>Learning indicators for each learning outcome</b></li> </ul>	<b>Learning Outcomes</b>		<b>Learning Indicators</b>		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"> <li>Describe and demonstrate knowledge of how to differentiate between different materials in the environment.</li> <li>Design activities to identify different materials and</li> </ul>		<ul style="list-style-type: none"> <li>Produce a report and chats on how to differentiate between different materials in the environment.</li> </ul>		Sharing ideas in class, the Student teachers develop the skills of communication, collaboration and mutual respect why appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion, well		

	<p>classify them into two main groups, metals and non-metals.</p> <ul style="list-style-type: none"> <li>Use ICT resources (video) to discuss the modern day uses of metals and non-metals.</li> </ul>	<ul style="list-style-type: none"> <li>Designed activities for classification of materials into metals and non-metals</li> <li>Provide a list of modern day uses of metals and non-metals.</li> <li>Present a mini project on metals and non metals</li> </ul>	handling of devices, honesty and accuracy.	
Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
Metals and Non-Metals (B5.1.2.2.1, B6.1.2.1.1, B6.1.2.2.1)	Types of materials : Characteristic s of metals and non-metals	<b>140 minutes</b>	<p><b>Face-to-face/Group activity</b></p> <p>Tutor guides student teachers to form groups of 3 members of mixed abilities to brainstorm, watch videos and perform activities to identify and describe the distinct features (characteristics) of metals and non-metals. <a href="https://www.youtube.com/watch?v=ZQ2B-AyxZs">https://www.youtube.com/watch?v=ZQ2B-AyxZs</a> (Ensure that different abilities and strengths/needs are catered for to ensure a safe working environment and equal opportunities)</p>	<p><b>Face-to-face/Group activity</b></p> <p>Student teachers work in groups to brainstorm and watch videos on the distinct features of metals and non-metals and produce a list of some metals and non-metals found in their environment Student teachers draw concept maps of metals and non-metals according to their characteristics (physical and chemical properties) <b>Mini project:</b> Student teachers design simple processes or activities that can be used to distinguish between metals and non-metals</p>
	Modern day uses of metals and non-metals. (B5.1.2.2.1, B6.1.2.1.1, B6.1.2.2.1)	<b>40 minutes</b>	<p><b>Face-to-face/Group activity</b></p> <p>Tutor guides student teachers, working in mixed ability groups to discuss the uses of metals and non-metals</p>	<p><b>Face-to-face/Group activity</b></p> <p>Student teachers work in mixed ability groups to produce chats on modern day uses of metals and non-metals</p>
<b>Which cross cutting issues will be addressed or developed and how</b>	Equity and SEN: through setting ground rules to protect vulnerable student-teachers and establishing an interactive and inclusive classroom atmosphere. Through the differentiation of metals and non-metals and how they react to become useful to society, student-teachers' accuracy, honesty and carefulness will be addressed.			
<b>Lesson assessments – evaluation of learning: of, for and as learning within the lesson</b>	Assessment as learning: Student teachers build stock of materials in terms of metals and non-metals and match materials according to their physical and chemical properties. Assessment of learning: Student teachers present mini projects on simple activities to distinguish between metals and non-metals or concept maps of metals and non-metals and match materials.			
<b>Teaching Learning Resources</b>	Some resources that would be required to successfully enable an inclusive integrated science teaching would be Laboratory equipment, Chemicals, Smartphones, Tablets, Laptops, Desktop computer, Productivity tools (software that allow teachers to work better), Subject based instructional tools/applications. YouTube videos e.g. <a href="https://www.youtube.com/watch?v=ZQ2B-AyxZs">https://www.youtube.com/watch?v=ZQ2B-AyxZs</a>			
<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.			

<b>Additional Reading List</b>	<p>Abbey, T. K., &amp;Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i>. Accra: Unimax Macmillan.</p> <p>Ameyibor, K., &amp;Wiredu, M. B. (2006). <i>Ghana association of science teachers chemistry for senior high schools</i>. Accra: Unimax MacMillan.</p> <p>Asabere-Ameyaw, A., &amp;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., &amp;Obeng-Ofori, D. (2011). <i>SWL integrated science for senior high schools: Students book</i>. Accra, Ghana; Sam-Woode Ltd.</p>
<b>CPD Requirement</b>	Training in improvisation and the use everyday simple materials to teach upper primary science

## Lesson 4

<b>Year of B.Ed.</b>	2	<b>Semester</b>	1	<b>Place of lesson in semester</b>	123 <b>4</b> 5 6 7 8 9 10 11 12
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Title of Lesson	RUSTING				Lesson Duration			3
<b>Lesson description</b>	This lesson is designed to equip the student teacher with requisite pedagogic knowledge and understanding of the skills to identify corrosion as rusting of ferrite metals. The student teacher will be introduced to the causes and effects of rusting of iron, cleaning rust from surface of iron and methods of preventing rusting such as: painting, oiling or greasing; insulating the surface of iron from air.							
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Student-teachers have studied the properties of metals and non-metals and their characteristics in the previous lesson.							
<b>Possible barriers to learning in the lesson</b>	Misconception on iron and steel, and prevention of rust.							
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face</b> <input checked="" type="checkbox"/>	<b>Practical Activity</b> <input checked="" type="checkbox"/>	<b>Work-Based Learning</b>	<b>Seminar</b>	<b>Independent Study</b> <input checked="" type="checkbox"/>	<b>e-learning opportunities</b> <input checked="" type="checkbox"/>		
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	The course will be delivered using the following methods: <b>Face-to-face:</b> Discussion, presentations (group/individual) <b>Practical activity:</b> demonstrations, brainstorming <b>Independent Study:</b> project work/practical work and <b>e-learning opportunities:</b> videos and computer simulations.							
<ul style="list-style-type: none"> <li><b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b></li> <li><b>Write in full aspects of the NTS addressed</b></li> </ul>	<ul style="list-style-type: none"> <li>Acquire practical knowledge of the causes of rusting and how it can be prevented.</li> <li>Discard the common misconceptions that student teachers have on rusting of elements.</li> <li>Demonstrate understanding of the disadvantages of rusting.</li> <li>Designing activities to teach prevention of rusting.</li> </ul> <p>NTS: The teacher: 1a: Critically and collectively reflects to improve teaching and learning. 1b: Improves personal and professional development through lifelong learning and Continuous Professional Development. 1c: Demonstrates effective growing leadership qualities in the classroom and wider school. 2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 2e: Understands how children develop and learn in diverse contexts and applies this in his or her teaching</p>							
<ul style="list-style-type: none"> <li><b>Learning Outcome for the lesson, picked and developed from the course specification</b></li> <li><b>Learning indicators for each learning outcome</b></li> </ul>	<b>Learning Outcomes</b>		<b>Learning Indicators</b>		<b>Identify which cross – cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed</b>			
	<ul style="list-style-type: none"> <li>Exhibit knowledge and understanding of the causes of rusting</li> <li>Design practical activities/means for the prevention of rusting</li> <li>Engage in micro teaching of rusting and its prevention</li> </ul>		<ul style="list-style-type: none"> <li>Produced reports and chats on the causes of rusting</li> <li>Designed activities on prevention of rust</li> <li>Micro teaching of the topic rusting and its prevention</li> </ul>		Sharing ideas in class, the Student teachers develop the skills of communication, collaboration and mutual respect why appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion, well handling of devices, honesty and accuracy.			

Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
Rusting (B5.1.2.2.1, B6.1.2.1.1, B6.1.2.2.1)	Rusting	50 minutes	<b>Face-to-face:</b> Tutor guides student teachers to brainstorm on the meaning of rust and the environmental problems associated with the disposal of used metals.	<b>Face-to-face/Group activity:</b> Student teachers work in mixed ability groups to brainstorm on the meaning of rust and the environmental problems associated with the disposal of used metals. Student teachers produce a report on their brainstorming.
(B5.1.2.2.1, B6.1.2.1.1, B6.1.2.2.1)	Causes of rusting	60 minutes	<b>Face-to-face/Group activity:</b> Tutor guides student teachers to discuss the causes and effects of rusting, for example, gradual degradation of metals.  Tutor guides student teachers to perform simple activities on the causes of corrosion of metals.	<b>Face-to-face/Group activity:</b> Student teachers collect and examine metal objects from the environment for signs of rust and carry out activities to determine causes of rusting.  Student teachers work in groups to perform activities to demonstrate the conditions necessary for rusting to occur.
(B5.1.2.2.1, B6.1.2.1.1, B6.1.2.2.1)	Preventing rust	70 minutes	Face-to-face/Group activity: Tutor guides student teachers to discuss methods used to prevent rusting, for example: painting, oiling or greasing; insulating the surface of iron from air. Other methods worth considering are <ul style="list-style-type: none"> <li>• Alloying</li> <li>• Galvanizing</li> <li>• Coating and Painting</li> <li>• Greasing</li> <li>• Humidity control</li> </ul>	Face-to-face/Group activity: student teachers brainstorm to come out with methods of cleaning and preventing rusting. They then demonstrate and design an activity on how to prevent iron from rusting. Student teachers use concept mapping to sum up the discussions on rusting.  Student teachers work in their groups to do a 5-minutes micro teaching of the topic rusting and its prevention
<b>Which cross cutting issues will be addressed or developed and how</b>	Equity and SEN: through setting ground rules to protect vulnerable student-teachers and establishing an interactive and inclusive classroom atmosphere. Through the process of rusting and its prevention, student-teachers' accuracy, honesty and carefulness will be addressed.			
<b>Lesson assessments – evaluation of learning: of, for and as learning within the lesson</b>	Assessment as learning: Student teachers build stock of materials in terms corrosion/rusting and match materials according to their physical and chemical properties. Assessment of learning: student teachers submit project work, class assignments and presentations, and portfolio			
<b>Teaching Learning Resources</b>	Some resources that would be required to successfully enable an inclusive integrated science teaching would be Laboratory equipment, Chemicals, Smartphones, Tablets, Laptops, Desktop computer, Productivity tools (software that allow teachers to work better), Subject based instructional tools/applications.			
<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.			

<b>Additional Reading List</b>	<p>Abbey, T. K., &amp;Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high schools</i>. Accra: Unimax Macmillan.</p> <p>Ameyibor, K., &amp;Wiredu, M. B. (2006). <i>Ghana association of science teachers chemistry for senior high schools</i>. Accra: Unimax MacMillan.</p> <p>Asabere-Ameyaw, A., &amp;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., &amp;Obeng-Ofori, D. (2011). <i>SWL integrated science for senior high schools: Students book</i>. Accra, Ghana; Sam-Woode Ltd.</p>
<b>CPD Requirement</b>	Training in sourcing appropriate multimedia resources for use in the upper primary science teaching

## Lesson 5

<b>Year of B.Ed.</b>	2	<b>Semester</b>	1	<b>Place of lesson in semester</b>	123 4 <b>5</b> 6 7 8 9 10 11 12
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<b>Title of Lesson</b>	Measurement in Science				<b>Lesson Duration</b>	<b>3 Hours</b>	
<b>Lesson description</b>	In this lesson, student teachers are taken through the meaning of temperature and units of temperature, reading temperature on analogue and digital thermometers, handling and using thermometers. Student teachers will engage in measurement activities which will enable them to better understand processes involved in measuring temperature. The lesson will also, enable student teachers to acquire the skill and pedagogic knowledge to teach Measurement of Temperature to the Basic School learner.						
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Student teachers have been engaging in estimations of body temperature and degree of hotness or coldness using the sense of touch.						
<b>Possible barriers to learning in the lesson</b>	Student teachers may: <ul style="list-style-type: none"> <li>• Have misconceptions of measurements of body temperature that may not be scientific</li> <li>• Not have been measuring accurately using measuring devices.</li> <li>• Not have the skills in teaching measurement of temperature to the Basic School learner.</li> </ul>						
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face</b> ✓	<b>Practical Activity</b> ✓	<b>Work-Based Learning</b>	<b>Seminars</b>	<b>Independent Study</b> ✓	<b>e-learning opportunities</b> ✓	<b>Practicum</b>
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	Face-to Face: Discussion, Tutor and student teachers' interaction on the use of thermometers for measuring temperatures Practical Activity: Practical manipulation and use of thermometers Independent Study: Inquiry and reflections e-learning opportunities: Use of internet sources, simulations and video presentations						
<ul style="list-style-type: none"> <li>• <b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b></li> <li>• <b>Write in full aspects of the NTS addressed</b></li> </ul>	<ul style="list-style-type: none"> <li>• Measure temperature accurately using thermometers</li> <li>• Identify appropriate tools used for measuring temperature</li> <li>• Demonstrate the skill and knowledge to teach the subject matter</li> </ul> <p>NTS: The teacher: 1a: Critically and collectively reflects to improve teaching and learning.            1b: Improves personal and professional development through lifelong learning and Continuous Professional Development.            1c: Demonstrates effective growing leadership qualities in the classroom and wider school.            2b Has comprehensive knowledge of the official school curriculum, including learning outcomes            2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in.            2e: Understands how children develop and learn in diverse contexts and applies this in his or her teaching</p>						
<ul style="list-style-type: none"> <li>• <b>Learning Outcome for the lesson, picked and developed from the course specification</b></li> <li>• <b>Learning indicators for each learning outcome</b></li> </ul>	<b>Learning Outcomes</b>		<b>Learning Indicators</b>		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"> <li>• Show understanding and skill of how to measure body temperature using thermometers</li> </ul>		<ul style="list-style-type: none"> <li>• Produce a chart showing body temperatures of classmates and of some solids and liquids</li> </ul>		Correct/ handling and uses of devices, good identification of tools for measurements, sharing ideas in class, conversion of temperature from degree Celsius to degree Fahrenheit, Student-teachers		

	<ul style="list-style-type: none"> <li>Demonstrate understanding of everyday applications of measurement of temperatures</li> <li>Prepare a lesson for the teaching of measurement</li> </ul>	<ul style="list-style-type: none"> <li>Ability to estimate hotness and coldness</li> <li>Present a 15-minutes lesson plan on how to teach measurement of temperatures in primary school</li> </ul>	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
Measurement in Science (B5.4.1.2.2)	Review of lesson 4	15 minutes	<b>Face-to-face:</b> Tutor led review of previous lesson and addresses areas that need further clarification	<b>Face-to-face/Group activity:</b> Student teachers work in groups to discuss lesson 4 and note areas that need further clarification
	Estimation of temperatures	45 minutes	<p><b>Face-to-face/Group activity:</b> Tutor introduces the lesson by reviewing student teachers' relevant previous knowledge on measurement of temperature. Allows student teachers to work in mixed ability groups to do estimation of body temperature</p> <p><b>Face-to-face:</b> Tutor uses open-ended questions to elicit misconceptions/incorrect ideas about measurement</p>	<p><b>Face-to-face/Group activity:</b> Student teachers tell their previous knowledge on measurement of body temperature. They work in groups to feel each other's body temperature using their palms.</p> <p><b>Face-to-face:</b> Student teachers answer open-ended questions to bring their incorrect ideas on measurement.</p>
	Meaning of temperature and units of temperature, reading temperature on analogue and digital thermometers, handling and using thermometers	60 minutes	<p><b>Face-to-face:</b> Tutor allows student teachers to brainstorm to come out with the meaning and units of temperature</p> <p><b>Practical activity:</b> In mixed groups (gender-based) of 3 members guide student teachers on how to use/handle analogue and digital thermometers to take the readings of temperatures of their colleagues in the groups to produce a chart.</p>	<p><b>Face-to-face:</b> Student teachers brainstorm to come out with the meaning and units of temperature</p> <p><b>Practical Activity:</b> In mixed groups (gender-based) of 3 members, student teachers practice how to use/handle analogue and digital thermometers to take the readings of temperatures of their colleagues in the groups to make a chart.</p>

	Teaching of how to teach measurement (using analogue and digital thermometers in taking the readings of body temperature) to the Basic school learner	<b>60 minutes</b>	<b>Face-to-face/E-learning opportunities:</b> Tutor allows student teachers to do short power point/poster presentation on how to teach measurement (using analogue and digital thermometers in taking the readings of body temperature) to the Basic school learner (Mixed intellectual ability Groups of 3 members).	<b>Face-to-face/Group activity:</b> Student teachers in groups do power point/poster presentation on how to teach measurement (using analogue and digital thermometers in taking the readings of body temperature) to the Basic school learner
<b>Which cross cutting issues will be addressed or developed and how</b>	Equity and SEN: through setting ground rules to protect vulnerable student-teachers and establishing an interactive and inclusive classroom atmosphere. By practicing with analogue and digital thermometers, student-teachers' difficulties in manipulating/handling/measuring skills of body temperatures will be addressed.			
<b>Lesson assessments – evaluation of learning: of, for and as learning within the lesson</b>	Assessment of learning: Charts produced by student teachers of body temperatures of their colleagues using analogue and digital thermometers to measure. Assessment as learning: Student teachers doing short presentations (3-5 minutes each) on how to teach measurement (using analogue and digital thermometers in taking the readings of body temperature) to the Basic school (Reflection on presentations).			
<b>Teaching Learning Resources</b>	Digital and analogue thermometers, containers, water, poster paper, markers, computers			
<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan; Handbook for PD Coordinators Themes 1- 10			
<b>Additional Reading List</b>	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.			
<b>CPD Requirement</b>	Practicing how to handle/measure with analogue and digital thermometers accurately			

## Lesson 6

Year of B.Ed.	2	Semester	1	Place of lesson in semester	123 4 5 <b>6</b> 7 8 9 10 11 12		
<b>Title of Lesson</b>	Misconceptions about Measurement in Science			<b>Lesson Duration</b>	<b>3 Hours</b>		
<b>Lesson description</b>	In this lesson, Tutor discusses with student teachers' common misconceptions about temperature and physical measure Area/volume of plane figures, Mass/weight of objects). In common usage, temperature has been misconstrued to be heat, the mass of an object is often referred to as its weight, though these are in fact different concepts and quantities, and area/volumes of plane figure are often difficult to measure. The lesson will enable students to have conceptual understanding of temperature, use scientific vocabulary like mass and weight appropriately, find areas/volumes of plane figures correctly and teach physical measure of Area/volume of plane figures, Mass/weight.						
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Student teachers can measure the body temperatures of their colleagues using analogue and digital thermometers.						
<b>Possible barriers to learning in the lesson</b>	Student teachers may: <ul style="list-style-type: none"> <li>• Have misconceptions of temperature and heat,</li> <li>• Use mass and weight interchangeably</li> <li>• Think that area/volume of plane figures and objects cannot be measured by measuring devices</li> </ul>						
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face</b> √	<b>Practical Activity</b> √	<b>Work-Based Learning</b>	<b>Seminars</b>	<b>Independent Study</b> √	<b>e-learning opportunities</b> √	<b>Practicum</b>
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	Face-to Face: Discussion, Tutor and student teachers' interactions on the functions of simple machines Practical Activity: Practical manipulation of simple machines Independent Study: Inquiry and reflections e-learning opportunities: Use of internet, simulations and video presentations						
<ul style="list-style-type: none"> <li>• <b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b></li> <li>• <b>Write in full aspects of the NTS addressed</b></li> </ul>	<ul style="list-style-type: none"> <li>• Measure accurately with some measuring tools</li> <li>• Identify appropriate tools used for measurements</li> <li>• Identify appropriate scientific vocabulary usage</li> <li>• Demonstrate the skill in teaching the subject matter</li> </ul> <p>NTS: The teacher:</p> <p>1a: Critically and collectively reflects to improve teaching and learning.            1b: Improves personal and professional development through lifelong learning and Continuous Professional Development.            1c: Demonstrates effective growing leadership qualities in the classroom and wider school.</p> <p>2b Has comprehensive knowledge of the official school curriculum, including learning outcomes            2c: Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in.            2e: Understands how children develop and learn in diverse contexts and applies this in his or her teaching</p>						

<ul style="list-style-type: none"> <li>Learning Outcome for the lesson, picked and developed from the course specification</li> <li>Learning indicators for each learning outcome</li> </ul>	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	
	Identify misconceptions about temperature and measure Area/volume of plane figures, Mass/weight of objects.	<ul style="list-style-type: none"> <li>Produced charts showing measurements of area and volume of plane figures</li> <li>Produced chart showing measurements of mass and weight of objects</li> </ul>	Correct/ handling and uses of devices, good identification of tools for measurements, sharing ideas in class, Student-teachers develop skills of communication, collaboration and mutual respect while appreciating individual difference and abilities, critical thinking and responsibility through careful participation in group work/discussion.	
Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
Misconceptions about Measurement in Science	Misconceptions about physical measure (Area/volume of plane figures, Mass/weight).	120 minutes	<p><b>Face-to-face:</b> Tutor introduces the lesson by allowing Student teachers to reflect and summarize the previous week’s lesson.</p> <p><b>Face-to-face:</b> Tutor uses open-ended questions to elicit misconceptions/incorrect/naive ideas about physical measure (Area/volume of plane figures, Mass/weight)</p> <p><b>Face-to-face/Group activity:</b> Tutor guides studentteachers to form groups of 3 members each (mixed intellectual ability/gender-based) to measure area, volume of plane figures and measure mass and weight of objects using rulers, electronic and spring balance (match box, cubes of sugar, chalk box, exercise books)</p> <p><b>Face-to-face/E-learning opportunities:</b> Tutor allows studentteachers to do short power point/poster presentation on how to teach measurement (Area/volume of plane figures, Mass/weight) to the Basic school learner (Mixed intellectual ability Groups of 3 members).</p>	<p><b>Face-to-face:</b> Student teachers reflect and summarize the previous week’s lesson.</p> <p><b>Face-to-face:</b> Student teachers answer open-ended questions to bring their misconceptions/incorrect/naive ideas about physical measure (Area/volume of plane figures, Mass/weight).</p> <p><b>Face-to-face/Group activity:</b> student teachers in groups of 3 members each (mixed intellectual ability/gender-based) measure area, volume of plane figures and measure mass and weight of objects using rulers, electronic and spring balance (match box, cubes of sugar, chalk box, exercise books)</p> <p><b>Face-to-face/Group activity:</b> Student teachers in groups do power point/poster presentation on how to teach measurement (Area/volume of plane figures, Mass/weight) to the Basic school learner.</p>

	Use of appropriate scientific vocabulary	<b>60 minutes</b>	<b>E-learning/Independent study:</b> Tutor allows individual student teachers to research online resources for use of appropriate scientific vocabulary especially for when to use mass and weight of objects to produce charts. <a href="https://study.com/academy/lesson/what-is-mass-lesson-for-kids.html">https://study.com/academy/lesson/what-is-mass-lesson-for-kids.html</a>	<b>E-learning/Independent study:</b> Individual student teachers search online resources for use of appropriate scientific vocabulary with regard to the use of mass and weight of objects to produce charts.
<b>Which cross cutting issues will be addressed or developed and how</b>	Equity and SEN: through setting ground rules to protect vulnerable student-teachers and establishing an interactive and inclusive classroom atmosphere. By practicing with measuring of area/volume of plane figures and also doing online research on the correct vocabulary of mass and weight of objects, student-teachers' difficulties in manipulating/handling/measuring/vocabulary usage skills will be addressed.			
<b>Lesson assessments – evaluation of learning: of, for and as learning within the lesson</b>	Assessment of learning: Charts produced by studentteachers online research of appropriate scientific vocabulary with regard to the use of mass and weight of objects. Assessment as learning: Studentteachers' measurement of area/volume of plane figures and mass/weight of objects helps to assess their learning (Use checklist to ascertain, no score, just praise)			
<b>Teaching Learning Resources</b>	match box, cubes of sugar, chalk box, exercise books, manila cards multimedia resources. YouTube videos e.g. <a href="https://study.com/academy/lesson/what-is-mass-lesson-for-kids.html">https://study.com/academy/lesson/what-is-mass-lesson-for-kids.html</a>			
<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan; Handbook for PD Coordinators Themes 1- 10			
<b>Additional Reading List</b>	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.			
<b>CPD Requirement</b>	Training in selecting appropriate e-resources for teaching upper primary school lessons. Practicing how to handle/measure areas/volume and mass/weight accurately			

# Lesson 7

<b>Year of B.Ed.</b>	2	<b>Semester</b>	1	<b>Place of lesson in semester</b>	123 4 5 6 <b>7</b> 8 9 10 11 12
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<b>Title of Lesson</b>	<b>Course Review 1 with STS seminar</b>				<b>Lesson Duration</b>	<b>3 hours</b>
<b>Lesson description</b>	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).					
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Lessons learnt from lesson 1 through lesson 6 in all learning approaches and observations/experiences during STS.					
<b>Possible barriers to learning in the lesson</b>	Misconception to some concepts not adequately dealt with. Lessons not appropriately understood by student - teachers.					
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face</b> √	<b>Practical Activity</b>	<b>Work-Based Learning</b>	<b>Seminars</b> √	<b>Independent Study</b> √	<b>e-learning opportunities</b> √
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	Face-to-Face: Discussion, group work in same ability group works. Modelling, Concept Mapping and Cartooning. Independent Study: Tutor and student teacher reflections (individually and collectively) e-learning Opportunities: OERs and Video presentations Seminar: Presentations, Discussions and reflections of STS					
<ul style="list-style-type: none"> <li><b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b></li> <li><b>Write in full aspects of the NTS addressed</b></li> </ul>	<ul style="list-style-type: none"> <li>Ascertain the level of understanding of concepts.</li> <li>Test various skills and cross – cutting issues</li> <li>Provide remedial tuition/tutorials on where necessary for experiences during STS</li> <li>Correct misconceptions and misinformation</li> <li>Build the necessary support going forward on SEN and Gender issue</li> </ul> <p>NTS:</p> <p>1a) Critically and collectively reflect to improve teaching and learning 1c) Demonstrate effective growing leadership qualities in the classroom and wider school 1d) Is guided by legal and ethical teacher codes of conduct in his or her development as a professional teacher</p> <p>2a) Demonstrates familiarity with the education system and key policies guiding it. 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes. 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in.</p>					
<ul style="list-style-type: none"> <li><b>Learning Outcome for the lesson, picked and developed from the course specification</b></li> <li><b>Learning indicators for each learning outcome</b></li> </ul>	<b>Learning Outcomes</b>	<b>Learning Indicators</b>			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"> <li>Identify weakness and strengths in learning the science lesson for the period under review</li> </ul>	<ul style="list-style-type: none"> <li>Make a list of Weaknesses and strengths on poster papers for sharing</li> </ul>	Collaborations, Communication and Research: Through group work and presentation			
	<ul style="list-style-type: none"> <li>Be able to reflect on lessons learnt so far STS and state new insights and/or grey areas needing remedies</li> </ul>	<ul style="list-style-type: none"> <li>Provide a reflection report on STS and demonstrations and illustrations on a given media of lessons learnt so far</li> </ul>	Equity and Reflection is developed from reflective activities			
	<ul style="list-style-type: none"> <li>Correct misconception/misinformation for earlier (lesson 1 – 6) lessons</li> </ul>	<ul style="list-style-type: none"> <li>Present concept maps and/or models linking misconceptions/misinformation to new insights</li> </ul>	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 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 1 with STS seminar			Facilitate and provides the necessary tool for students activities.	
	Reviewing the understanding of lessons on groups of plants, groups of animals, metals and non-metals, rusting, measurement in science, misconceptions about measurement of science	60 minutes	Face-to-face: Tutor led brainstorming session with student teachers to unearth the weaknesses and strengths of student teachers in the lessons 1 – 6. Initiate discussion /Talk for learning approach using groupings (Same ability and then mixed groups) to identify student teachers strengths and weakness in the lessons learnt so far.	Face-to-face: Student teachers discuss their problems in the previous lessons and provide a checklist identifying and recording all possible weaknesses and strengths.
	Discussion of observations during STS	90 minutes	Seminar: Teacher allows two or three resource persons to make presentations on STS based on the NTS. Tutor then guides student teachers through problem-based learning on National Teacher's Standards and reflection on observations made during STS.	Seminar: Student teachers listen to various presentations. Student teachers then discuss observations made during STS based on the National Teacher's Standards, reflect and provide a checklist of lessons learned and problems identified and how they can be addressed. Student teachers then provide a reflection report on STS
	Remedies to course topics	30 minutes	Face-to-Fae: Teacher groups student teachers according to remedy need and provide specific task assistance in the areas on concept needing remedy.	Face-to-Face: Students work in the special groups (Same remedy need group) on tasks to remedy their learning need. They then present concept maps and/or models linking misconceptions/misinformation to new insights.
<b>Which cross cutting issues will be addressed or developed and how</b>	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.			
<b>Lesson assessments – evaluation of learning: of, for and as learning within the lesson</b>	<ul style="list-style-type: none"> <li>• Student teachers presentations during group work and model work presentation helps to assess them of learning</li> <li>• Assessment for and as learning: Student teachers working in groups on remedial tutoring helps to assess them for and as learning</li> </ul>			
<b>Teaching Learning Resources</b>	Cardboards, Course manual, Poster paper, Projectors,			
<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.			
<b>Additional Reading List</b>	Abbey, T. K., &Essiah, J.W. (1995). <i>Ghana association of science teachers physics for senior high</i>			

	<p><i>schools</i>. Accra: Unimax Macmillan.</p> <p>Ameyibor, K., &amp;Wiredu, M. B. (2006). <i>Ghana association of science teachers chemistry for senior high schools</i>. Accra: Unimax MacMillan.</p> <p>Asabere-Ameyaw, A., &amp;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., &amp;Obeng-Ofori, D. (2011). <i>SWL integrated science for senior high schools: Students book</i>. Accra, Ghana; Sam-Woode Ltd.</p>
<b>CPD Requirement</b>	Training on preparation of checklist and Reflection guides

## Lesson 8

Year of B.Ed.	2	Semester	1	Place of lesson in semester	123 4 5 67 <b>8</b> 9 10 11 12		
<b>Title of Lesson</b>	<b>Teaching Ventilation I</b>			<b>Lesson Duration</b>	<b>3 Hours</b>		
<b>Lesson description</b>	This lesson exposes student-teachers to the concept of Convection as heat transfer due to the bulk movement of molecules within fluids such as gases and liquids. The concept will also give student-teachers understanding of the system and means of the movement of air within the environment.						
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Student-teachers are aware of the movement or circulation of air around them. Students are familiar with boiling soups and would have observed the movement of the content of the soup						
<b>Possible barriers to learning in the lesson</b>	Possible misconceptions about the flow of air and how water gets or liquids get heated when heated for either the bottom of the container or from the top						
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face</b> √	<b>Practical Activity</b> √	<b>Work-Based Learning</b>	<b>Seminars</b>	<b>Independent Study</b> √	<b>e-learning opportunities</b> √	<b>Practicum</b>
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	Face-to face: Discussions, demonstrations and observations, Group work and designing Independent Study: inquiry and Reflections e-learning Opportunities: Simulations, video presentations						
<b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b> • Write in full aspects of the NTS addressed	<ul style="list-style-type: none"> <li>• Get the conceptual understanding of convection</li> <li>• Discard the common misconceptions that student-teachers have about convection</li> <li>• Designing activities to teach convection</li> </ul> NTS: 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes p.12, 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. p.13 & 21)						
<ul style="list-style-type: none"> <li>• Learning Outcome for the lesson, picked and developed from the course specification</li> <li>• Learning indicators for each learning outcome</li> </ul>	<b>Learning Outcomes</b>	<b>Learning Indicators</b>		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"> <li>• explain convection current as would be presented to primary learners</li> <li>• Identify and give examples of everyday occurrences of convection in the environment.</li> <li>• Erase misconceptions about convections</li> <li>• Demonstrate understanding of the topic and be able to teach</li> </ul>	<ul style="list-style-type: none"> <li>• Presents simple learning materials (models, designs) for demonstrations of convection current</li> <li>• Present concept maps on the effects of convection</li> <li>• Produce charts of everyday occurrences of convection for their personal portfolio</li> </ul>	Through discussions and sharing of ideas in class student-teachers develop the skills of communication, collaboration and mutual respect while appreciating individual difference and abilities. They also acquire skills in handling devices, develop critical thinking, honesty, accuracy and responsibility through active participation in group work/discussion.				

Topic/Title	Sub Topic	Time or Stage	Teaching and learning to achieve learning outcomes: depending on delivery mode selected. Teacher led, collaborative group work or independent study	
			Teacher Activity	Student Activity
Teaching Ventilation I (B5.4.1.2.1)	Meaning of convection current	60 minutes	<b>Face-to-face/Group activity:</b> Teacher puts student-teachers in groups of 5 to brainstorm and discuss the meaning of convection current that can make meaning to the primary school learner (ensure that different abilities and strengths/needs are catered for to ensure a safe working environment and equal opportunities). Allow each group 5 minutes to present their findings	<b>Face-to-face/Group activity:</b> Student-teachers brainstorm and discuss the meaning of convection current that can make meaning to the primary school learner. Student-teachers use concept maps and shower thoughts to explain convection current. Groups present their findings to the class. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Convection currents	60 minutes	<b>Face-to-face/Group activity:</b> Teacher led group discussions on applications of convection currents (groups should be inclusive, multi-age, and developmentally appropriate). Assist student-teachers to design a simple experiment with boiling water (a straw can be used to colour the bottom of the water) to demonstrate convection currents	<b>Face-to-face/Group activity:</b> Student-teachers use shower thoughts/discussions on applications of convection currents. Demonstrate convection current by boiling water colored at the base. Report on everyday occurrences of convection current in the environment and their homes. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Application of convection (B5.4.1.2.1)	60 minutes	<b>Face-to-face/Group activity:</b> Instructs student-teachers provide list/chats of effects of poor ventilation (Examples boiling of water, warm air rising toward the ceiling or attic of a house. Warm air is less dense than cool air, so it rises). Show short video clips on convection.	<b>Face-to-face/Group activity:</b> Student-teachers watch short video clips or simulations and discuss in mixed ability groups the application of convection and produce chats for presentation and display.
<b>Which cross cutting issues will be addressed or developed and how</b>	Equity and SEN: through appropriate gender and equity sensitive group work to protect vulnerable student-teachers, establish an interactive and inclusive classroom atmosphere			
<b>Lesson assessments – evaluation of learning: of, for and as learning within the lesson</b>	<ul style="list-style-type: none"> <li>Assessment of learning: student-teachers write a short examination on convection currents by end of semester (determine marks from score sheet)</li> <li>Assessment as learning: collections designed experiments reports, reflective reports</li> <li>Assessment for learning: student-teachers peer review and report on everyday applications of convection.</li> </ul>			
<b>Teaching Learning Resources</b>	Cardboards, poster papers, beakers or cooking pans, source of heat, poster colours, phones, tablets, desktop computers with internet access. <a href="https://www.thoughtco.com/convection-currents-definition-and-examples-4107540">https://www.thoughtco.com/convection-currents-definition-and-examples-4107540</a>			

<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan; Handbook for PD Coordinators Themes 1 – 10. SCIENCE CURRICULUM FOR PRIMARY SCHOOLS (BASIC 4 - 6),SEPTEMBER 2019
<b>Additional Reading List</b>	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.
<b>CPD Requirement</b>	Training on designing experiments for primary science teaching.

## Lesson 9

<b>Year of B.Ed.</b>	2	<b>Semester</b>	1	<b>Place of lesson in semester</b>	123 4 5 678 <b>9</b> 10 11 12
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<b>Title of Lesson</b>	<b>Teaching Ventilation II</b>				<b>Lesson Duration</b>	<b>3 Hours</b>	
<b>Lesson description</b>	This lesson exposes student-teachers to conceptualize ventilation in the form of aeration and how to help the primary school learner appreciate the need for fresh air and proper aeration. The concept will also give student-teachers understanding of how to explain to the primary school learner how the system allows the movement of air between the environment and the lungs through inhalation and exhalation.						
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Student-teachers are aware of the need for proper aeration/ventilation in their houses through the use of fans, air conditioners and the previous lesson explained convection currents.						
<b>Possible barriers to learning in the lesson</b>	Possible misconceptions about causes of illnesses, e.g. headaches, fatigues, suffocation and lung diseases, which may have arisen as a result of poor ventilation.						
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face</b> √	<b>Practical Activity</b>	<b>Work-Based Learning</b>	<b>Seminars</b>	<b>Independent Study</b> √	<b>e-learning opportunities</b> √	<b>Practicum</b>
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	Face-to face: Discussions, demonstrations and observations, Group work and designing Independent Study: Inquiry and Reflections e-learning Opportunities: Simulations, video presentations						
<b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b> <ul style="list-style-type: none"> <li>Write in full aspects of the NTS addressed</li> </ul>	<ul style="list-style-type: none"> <li>Get the conceptual understanding of ventilation</li> <li>Discard the common misconceptions that student-teachers have about illnesses caused as a result of poor ventilation</li> <li>Designing activities to teach ventilation</li> </ul> NTS: 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes p.12, 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. p.13 & 21						
<ul style="list-style-type: none"> <li>Learning Outcome for the lesson, picked and developed from the course specification</li> <li>Learning indicators for each learning outcome</li> </ul>	<b>Learning Outcomes</b>		<b>Learning Indicators</b>		<b>Identify which cross-cutting issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed</b>		
	<ul style="list-style-type: none"> <li>Define and explain convection current in relation to the concept of ventilation</li> </ul>		<ul style="list-style-type: none"> <li>Presents Concept maps on the relationships between convection currents and aeration</li> </ul>		Through discussions and sharing of ideas in class student-teachers develop the skills of communication, collaboration and mutual respect while appreciating individual difference and abilities. They also acquire skills in handling devices, develop critical thinking, honesty, accuracy and responsibility through active participation in group work/discussion.		
	<ul style="list-style-type: none"> <li>Identify conditions of good and poor ventilation</li> </ul>		<ul style="list-style-type: none"> <li>Report writing on models of good and bad conditions for ventilation</li> </ul>				
<ul style="list-style-type: none"> <li>Erase misconceptions about the effects of poor ventilation which leads to headaches and fatigues</li> </ul>		<ul style="list-style-type: none"> <li>List the effects of poor ventilation and how they can be remedied</li> </ul>					

	<ul style="list-style-type: none"> <li>Demonstrate understanding of the topic and be able to teach.</li> </ul>	<ul style="list-style-type: none"> <li>Present reflective reports on lesson materials developed.</li> </ul>		
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 Ventilation II (B5.4.1.2.1)	Ventilation and convection current	minutes	<b>Face-to-face/Group activity:</b> Put student-teachers into different ability group activities to brainstorm on ventilation and convection currents (ensure that different abilities and strengths/needs are catered for to ensure a safe working environment and equal opportunities).	<b>Face-to-face/Group activity:</b> Student-teachers brainstorm to come out with the relation between convection and ventilation. Student-teachers use mind maps and shower thoughts to explain ventilation in terms of convection current. Groups make 5-minutes presentations of their findings to the class. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Applications of convection	minutes	<b>Face-to-face/Group activity:</b> Teacher led group discussions on applications of convection currents (Examples; sea breeze, land breeze, air conditioning, fridge, chimney and ventilation of rooms). Groups plan and develop ways of increasing ventilation in their homes and classrooms. (The groups should be inclusive, multi-age, and developmentally appropriate).	<b>Face-to-face/Group activity:</b> Student-teachers use shower thoughts/discussions on applications of convection currents to discuss why and how rooms should be ventilated. Report on everyday applications of ventilation and convection current in their homes. (PD Theme 8, pg. 40; PD Theme 4, pg. 23-46)
	Causes of poor ventilation and its effects	minutes	<b>Face-to-face/Group activity:</b> Teacher led discussion of the causes of poor ventilation and how they can be remedied. Require of student teachers to develop models of how to present aeration to primary school learners.	<b>Face-to-face/Group activity:</b> Discuss in mixed ability groups the effects of poor ventilation and make 2-minute presentations of how they can be resolved. Student-teachers provide list/chats of effects of poor ventilation and how they can be resolved
<b>Which cross cutting issues will be addressed or developed and how</b>	Equity and SEN: through appropriate gender and equity sensitive group work to protect vulnerable student-teachers, establish an interactive and inclusive classroom atmosphere			
<b>Lesson assessments – evaluation of learning: of, for and as learning within the lesson</b>	<ul style="list-style-type: none"> <li>Assessment of learning: student-teachers write a short examination on convection currents and ventilation</li> <li>Assessment as learning: student-teachers make presentations on the effects of poor ventilation and how to resolve them</li> <li>Assessment for learning: student-teachers peer review chats, mind maps and shower thoughts, and report on everyday applications of ventilation.</li> </ul>			
<b>Teaching Learning Resources</b>	Cardboards, poster papers, poster colours, phones, tablets, desktop computers with internet access.			

<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan; Handbook for PD Coordinators Themes 1 – 10.
<b>Additional Reading List</b>	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.
<b>CPD Requirement</b>	Training on developing modelling concepts into concrete models.

## Lesson 10

<b>Year of B.Ed.</b>	2	<b>Semester</b>	1	<b>Place of lesson in semester</b>	12 3 4 5 6 7 8 9 <b>10</b> 11 12
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<b>Title of Lesson</b>	Psychology of Early Adolescent Learner and Science Teaching and Learning I				<b>Lesson Duration</b>	<b>3 Hours</b>	
<b>Lesson description</b>	Science learning at the basic school can be challenging to the learning especially the early adolescent. Their inclination to risk taking and rapid development in psychosocial activities makes them both venerable and Critical in understanding their environment. This lesson introduces the student-teacher to the way early adolescent adapt into learning science, their cognitive and psychosocial needs and how early adolescents learn science.						
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Learners model lessons and materials for the primary learner from previous lessons and have an idea of the transition in growth from childhood to adulthood.						
<b>Possible barriers to learning in the lesson</b>	Student-teachers may: <ul style="list-style-type: none"> <li>Have misconceptions about age appropriate learning</li> </ul>						
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face ✓</b>	<b>Practical Activity</b>	<b>Work-Based Learning</b>	<b>Seminars ✓</b>	<b>Independent Study ✓</b>	<b>e-learning opportunities ✓</b>	<b>Practicum</b>
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	Face-to Face: Discussion, Student groups interactions on concepts of age appropriate learning Independent Study: Inquiry and reflections e-learning opportunities: Use of internet, simulations and video presentations Seminar: Reflective presentations						
<ul style="list-style-type: none"> <li><b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b></li> <li><b>Write in full aspects of the NTS addressed</b></li> </ul>	<ul style="list-style-type: none"> <li>Student-teachers will adopt much positive outlook to deal with early adolescent crises and learning difficulties</li> </ul> <p>NTS:</p> <p>1b) Improves personal and professional development through lifelong learning and Continuous Professional Development</p> <p>2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes.</p> <p>2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in.</p> <p>2e) Understands how children develop and learn in diverse contexts and applies this in his or her teaching</p> <p>3f) Pays attention to all learners, especially girls and students with Special Educational Needs, ensuring their progress.</p> <p>3g) Employs instructional strategies appropriate for mixed ability, multilingual and multi-age classes.</p> <p>3h) Sets meaningful tasks that encourages learner collaboration and leads to purposeful learning</p>						
<ul style="list-style-type: none"> <li><b>Learning Outcome for the lesson, picked and developed from the course specification</b></li> <li><b>Learning indicators for each learning outcome</b></li> </ul>	<b>Learning Outcomes</b>		<b>Learning Indicators</b>		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"> <li>Explain the developmental need of the early adolescent and how they relate to science learning. (NTS 2c, p.13 &amp; 21), (NTS 2c, p.13 &amp; 21), (NTS2b, p.12, 2c, p.13 &amp; 21)</li> </ul>		<ul style="list-style-type: none"> <li>Produce a chart showing development needs of the early adolescent relating to science learning.</li> </ul>		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
Psychology of Early Adolescent Learner and Science Teaching and Learning I	Misconceptions/incorrect ideas about adolescents	30 minutes	Face-to-face: Tutor introduces the lesson by reviewing Student-teachers' relevant previous knowledge on adolescent physical characters  Face-to-face: Open-ended questions to elicit misconceptions/incorrect ideas about the adolescent	Face-to-face: Student-teachers tell their previous knowledge on the adolescent characteristics.  Face-to-face: Student-teachers answer open-ended questions to bring their incorrect ideas adolescent.
	The Early Adolescent Learner	30 minutes	Face-to-face: Allow student-teachers to discuss and come out with the Cognitive and psychosocial need of the early adolescent	Face-to-face: Student-teachers discuss and come out with the Cognitive and psychosocial needs of the early adolescent
		30 minutes	Nature walk to inquire from environment: In mixed groups (gender-based) of 3 members guide student-teachers to walk to the practice school nearby or to randomly gather any young person within the age group of adolescent and gather as much information about learning inclination from them.  Independent study: Provide for teachers, OERs and videos of Early adolescent learners so they can obtain information on how they learn science	Nature walk to inquire from environment: In mixed groups (gender-based) of 3 members, student-teachers walk to the practice school nearby or to randomly gather any young person within the age group of adolescent and gather as much information about learning inclination from them  Independent study: student-teachers, still in their groups, Observe carefully and write reports on how early adolescent learners learn science.
iii Adapting the early adolescent to learn science	60 minutes	Face-to-face/E-learning opportunities: Tutor allows student-teachers to do short power point/poster presentation on how early adolescent learners can better learn science.	Face-to-face/E-learning opportunities: Student-teachers in groups do power point/poster presentation on how early adolescent learners can better learn science.	
<b>Which cross cutting issues will be addressed or developed and how</b>	Equity and SEN: through setting ground rules to protect vulnerable student-teachers and establishing an interactive and inclusive classroom atmosphere. By practicing with analogue and digital thermometers, student-teachers' difficulties in manipulating/handling/measuring skills of body temperatures will be addressed.			
<b>Lesson assessments – evaluation of learning: of, for and as learning within the lesson</b>	<ul style="list-style-type: none"> <li>Assessment as and for learning: Reports and posters on how early adolescent learns Science.</li> <li>Student teachers doing short presentations (3-5 minutes each) on how to adolescent can be adapted to learn science.</li> </ul>			

<b>Teaching Learning Resources</b>	Training on reflections and nature walk
<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan; Handbook for PD Coordinators Themes 1- 10
<b>Additional Reading List</b>	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). <i>SWL integrated science for senior high schools: Students book</i> . Accra, Ghana; Sam-Woode Ltd.
<b>CPD Requirement</b>	N/A

# Lesson 11

<b>Year of B.Ed.</b>	2	<b>Semester</b>	1	<b>Place of lesson in semester</b>	12 3 4 5 6 7 8 9 10 <b>11</b> 12
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<b>Title of Lesson</b>	Psychology of Early Adolescent Learner and Science Teaching and Learning II			<b>Lesson Duration</b>	<b>3 Hours</b>		
<b>Lesson description</b>	Science learning at the basic school can be challenging to the learning especially the early adolescent. Their inclination to risk taking and rapid development in psychosocial activities makes them both venerable and Critical in understanding their environment. This lesson continues from lesson 10 and emphasizes on the student-teacher to the way early adolescent adapt into learning science, relate with others and considerations for grouping and interactions in a science classroom.						
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Student-teachers have an idea of the transition in growth from childhood to adulthood. Lesson 10 introduced student-teachers to early adolescent psychosocial and cognitive needs.						
<b>Possible barriers to learning in the lesson</b>	Student-teachers may: <ul style="list-style-type: none"> <li>Have misconceptions age appropriate learning</li> <li>Imagine that the most pressing consideration for early adolescent mingling is from the awareness of the opposite sex and adolescent sexuality.</li> </ul>						
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face</b> √	<b>Practical Activity</b>	<b>Work-Based Learning</b>	<b>Seminars</b> √	<b>Independent Study</b> √	<b>e-learning opportunities</b> √	<b>Practicum</b>
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	Face-to Face: Discussion, Student groups interactions on concepts of age appropriate learning Independent Study: Inquiry and reflections e-learning opportunities: Use of internet, simulations and video presentations						
<ul style="list-style-type: none"> <li><b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b></li> <li><b>Write in full aspects of the NTS addressed</b></li> </ul>	<ul style="list-style-type: none"> <li>Student-teachers will adopt much positive outlook to deal with early adolescent crises and learning difficulties</li> <li>Student-teachers will be able to manage excesses from egos and other considerations for early adolescent collaborations.</li> </ul>						
<ul style="list-style-type: none"> <li><b>Learning Outcome for the lesson, picked and developed from the course specification</b></li> <li><b>Learning indicators for each learning outcome</b></li> </ul>	<b>Learning Outcomes</b>	<b>Learning Indicators</b>		<b>Identify which cross – cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed</b>			
	<ul style="list-style-type: none"> <li>Identify the special needs and factors to consider to make science learning meaningful and enjoyable to primary school learners. (NTS 2c, p.13 &amp; 21), (NTS 2c, p.13 &amp; 21), (NTS2b, p.12, 2c, p.13 &amp; 21)</li> </ul>	<ul style="list-style-type: none"> <li>Produce a charts and checklists for issues to consider and pay attention to in making science learning meaningful and enjoyable to science learning for primary school learning.</li> </ul>	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
Psychology of Early Adolescent Learner and Science Teaching and Learning II	Adapting the early adolescent to learn science	<b>60 minutes</b>	Face-to-face: Tutor introduces the lesson by reviewing Student-teachers' relevant previous knowledge on how early adolescent learners learn science and list the features of nature and home that can be used to adapt science concepts to the primary school level using discussion and role play in mixed ability groups	Face-to-face: Student-teachers discuss their previous knowledge on how early adolescent learners learn science as well as identify and list the features of nature and home that can be used to adapt science concepts to the primary school level using discussion and role play in mixed ability groups. In doing so, they share their report from nature walk and reflections.
	The Adolescent Learner in and inclusive science classroom	<b>90 minutes</b>	Face-to-face: Create two sets of groups – one group in mixed sex groups and the other group in unisex (only male/only female), provide a topic for debate from the Basic school science curriculum (Curriculum for Basic school B4-B6) in a stated science topic, for each group e.g. measurement. and Not all elements in the debate/discussions that provides for inclusivity and values for learning science.  Independent study: Provide for student-teachers, a checklist on inclusive learning and age appropriate learning styles so that they will reflect on their observations	Face-to-face: Student-teachers debate and discuss in groups and later cross share their experiences and come out with the Cognitive and psychosocial needs of the early adolescent. They use a checklist designed with the help of the teacher to identify all elements that provides for inclusivity and values for learning science.  Independent study: student-teachers, reflects on their observations and using the check list analyse the inclusive styles and age appropriate learning of science.
	iii. Adapting the early adolescent to learn science	<b>30 minutes</b>	Face-to-face/E-learning opportunities: Tutor allows student-teachers to do short power point/poster presentation on their reflections	Face-to-face/E-learning opportunities: Student-teachers in groups do power point/poster presentation on their reflections.

<b>Which cross cutting issues will be addressed or developed and how</b>	Equity and SEN: through setting ground rules to protect vulnerable student-teachers and establishing an interactive and inclusive classroom atmosphere. By practicing with analogue and digital thermometers, student-teachers' difficulties in manipulating/handling/measuring skills of body temperatures will be addressed.
<b>Lesson assessments – evaluation of learning: of, for and as learning within the lesson</b>	<ul style="list-style-type: none"> <li>• Assessment of learning: Reflections report on inclusive science learning.</li> <li>• Assessment as Learning: Student-Teachers doing short presentations (3-5 minutes each) on reflections.</li> </ul>
<b>Teaching Learning Resources</b>	Training on reflections and nature walk and inclusive science classrooms.
<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan; Handbook for PD Coordinators Themes 1- 10
<b>Additional Reading List</b>	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.
<b>CPD Requirement</b>	Training for preparing checklist for identifying inclusivity and values for learning science Training on how to identify tolerance in group work

# Lesson 12

Year of B.Ed.	2	Semester	1	Place of lesson in semester	12 3 4 5 6 7 8 9 10 11 12		
<b>Title of Lesson</b>	Course Review II with STS seminar			<b>Lesson Duration</b>	<b>3 hours</b>		
<b>Lesson description</b>	This lesson is a review and audit of the lessons for the second half of the semester as well as review and discussion of lessons learned, reflection on observations made during the supported teaching in schools (STS) within the second half of the semester.						
<b>Previous student teacher knowledge, prior learning (assumed)</b>	Lessons learnt from lesson 8 through lesson 11 in all learning approaches and observations/experiences during STS.						
<b>Possible barriers to learning in the lesson</b>	Misconception to some concepts not adequately dealt with. Lessons not appropriately understood by student - teachers.						
<b>Lesson Delivery – chosen to support students in achieving the outcomes</b>	<b>Face-to-face</b> √	<b>Practical Activity</b>	<b>Work-Based Learning</b>	<b>Seminars</b> √	<b>Independent Study</b> √	<b>e-learning opportunities</b> √	<b>Practicum</b>
<b>Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.</b>	Face-to-Face: Discussion, group work in same ability group works. Modelling, Concept Mapping and Cartooning. Independent Study: Tutor and student teacher reflections (individually and collectively) e-learning Opportunities: OERs and Video presentations Seminar: Presentations, Discussions and reflections of STS						
<ul style="list-style-type: none"> <li><b>Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.</b></li> <li><b>Write in full aspects of the NTS addressed</b></li> </ul>	<ul style="list-style-type: none"> <li>Ascertain the level of understanding of concepts.</li> <li>Test various skills and cross – cutting issues</li> <li>Provide remedial tuition/tutorials on where necessary for experiences during STS</li> <li>Correct misconceptions and misinformation</li> <li>Build the necessary support going forward on SEN and Gender issue</li> </ul> NTS: 1a) Critically and collectively reflect to improve teaching and learning 1c) Demonstrate effective growing leadership qualities in the classroom and wider school 1d) Is guided by legal and ethical teacher codes of conduct in his or her development as a professional teacher 2a) Demonstrates familiarity with the education system and key policies guiding it. 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes. 2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in. 2e) Understands how children develop and learn in diverse contexts and applies this in his or her teaching						
<ul style="list-style-type: none"> <li><b>Learning Outcome for the lesson, picked and developed from the course specification</b></li> <li><b>Learning indicators for each learning outcome</b></li> </ul>	<b>Learning Outcomes</b>		<b>Learning Indicators</b>		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"> <li>Identify weakness and strengths in learning the science lesson for the period under review</li> </ul>		<ul style="list-style-type: none"> <li>Make a list of Weaknesses and strengths on poster papers for sharing</li> </ul>		Collaborations, Communication and Research: Through group work and presentation		
	<ul style="list-style-type: none"> <li>Be able to reflect on lessons learnt so far STS and state new insights and/or grey areas needing remedies</li> </ul>		<ul style="list-style-type: none"> <li>Provide a reflection report on STS and demonstrations and illustrations on a given media of lessons learnt so far</li> </ul>		Equity and Reflection is developed from reflective activities		
	<ul style="list-style-type: none"> <li>Correct misconception/misinformation for earlier (lesson 8– 11) lessons</li> </ul>		<ul style="list-style-type: none"> <li>Present concept maps and/or models linking misconceptions/misinformation to new insights</li> </ul>		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 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 with STS seminar	Reviewing the understanding of lessons on Ventillation I, Ventillation II, Psychology of Early Adolescent learner and Science Teaching and Learning I and Psychology of Early Adolescent learner and Science Teaching and Learning II	60 minutes	<b>Face-to-face:</b> Tutor led brainstorming session with student teachers to unearth the weaknesses and strengths of student teachers in the lessons 8 – 11. Initiate discussion /Talk for learning approach using groupings (Same ability and then mixed groups) to identify student teachers' strengths and weakness in the lessons learnt so far.	<b>Face-to-face:</b> Student teachers discuss their problems in the previous lessons and provide a checklist identifying and recording all possible weaknesses and strengths.
	Discussion of observations during STS	90 minutes	Seminar: Teacher allows two or three resource persons to make presentations on STS based on the NTS. Tutor then guides student teachers through problem-based learning on National Teacher's Standards and reflection on observations made during STS.	Seminar:Student teachers listen to various presentations. Student teachers then discuss observations made during STS based on the National Teacher's Standards, reflect and provide a checklist of lessons learned and problems identified and how they can be addressed. Student teachers then provide a reflection report on STS
	Remedies to course topics	30 minutes	Face-to-Face: Teacher groups student teachers according to remedy need and provide specific task assistance in the areas on concept needing remedy.	Face-to-Face: Students work in the special groups (Same remedy need group) on tasks to remedy their learning need. They then present concept maps and/or models linking misconceptions/misinformation to new insights.
<b>Which cross cutting issues will be addressed or developed and how</b>	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.			
<b>Lesson assessments – evaluation of learning: of, for and as learning within</b>	<ul style="list-style-type: none"> <li>Assessment as Learning: Student teachers' presentations during group work and model work presentation helps to assess them of learning</li> <li>Assessment for and as learning: Student teachers working in groups on remedial tutoring</li> </ul>			

<b>the lesson</b>	helps to assess them for and as learning
<b>Teaching Learning Resources</b>	Cardboards, Course manual, Poster paper, Projectors,
<b>Required Text (core)</b>	NaCCA, Ministry of Education (2019). Science Curriculum for Primary Schools (B4-B6). Accra Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., &Wiredu, M.B. (2008). <i>Ghana association of science teachers integrated science for senior high schools</i> . Accra: Unimax MacMillan.
<b>Additional Reading List</b>	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.
<b>CPD Requirement</b>	Training on preparation of checklist and Reflection guides



