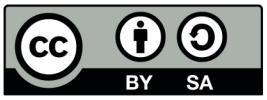
YEAR 1

SEMESTER 1

Four-Year B.Ed. Course Manual

INTRODUCTION TO INTEGRATED SCIENCE I

The Government of Ghana



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FOREWORD

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

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

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

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

Professor Mohammed Salifu
Director General,
Ghana Tertiary Education Commission

ACKNOWLEDGEMENTS

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

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

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

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

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

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

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

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INTRODUCTION TO COURSE MANUALS

Welcome to this B.Ed. Course manual.

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

The manuals serve the following purposes:

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

Specifically, they also:

- Support coherent lesson planning and teaching which will enable student teachers to achieve the NTS and become good teachers who ensure all pupils' learning whilst offering tutors the flexibility for adaptation for local needs and contexts.
- Provide a lesson by lesson overview of the course, building on and developing the material in the course specifications.
- Inform tutors, student teachers and others working with student teachers about:

    1. What is to be taught and why.
    2. How it can be taught.
    3. How it should be assessed.

- Provide opportunities for student teachers to develop and apply knowledge during supported teaching in school, creating a strong bond between learning in school and in the training institution.
- Reflect the stage of student teacher development, set out in the model for progress across the four years of the B.Ed.
- Can be used as self-study tools by student teachers.
- Ensure that all information necessary to inform teacher training is in one place (serves as reference document).
- The manuals are the basis of the CoEs 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 topics 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 topics for weekly PD meetings where tutors/lecturers will situate the lessons in the contexts of their colleges and their student teachers, in order 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 …….....

INTRODUCTION TO INTEGRATED SCIENCE I

COURSE DETAILS							
Course name	INTRODUCTION TO INTEGRATED SCIENCE I						
Pre-requisite	Introduction to Integrated Science I						
Course Level	100	**Semester**	1	**Course Code**		**Credit Value**	3

THE VISION FOR THE NEW FOUR-YEAR B.Ed. CURRICULUM

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 and so improve the learning outcomes and life chances of all learners they teach as set out in the National Teachers' Standards (NTS). This is expected to instil in new teachers, the Nation's core values of honesty, integrity, creativity and responsible citizenship and to achieve inclusive, equitable, and high-quality education for all learners

GOAL FOR THE SUBJECT OR LEARNING AREA

The science programme is designed to transform the new science 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 when teaching science at the Basic school.

COURSE DESCRIPTION

The course for semester one (1) reviews and consolidates basic science concepts of the student teacher on nature of science and matter. Topical issues are; History of Science, concepts of matter, measurement, safety precaution in laboratories and forces. Others are child study styles, Basic School science curriculum and developing portfolio for the Student Reflective Journal.

Real life situations and desired Pedagogical Content Knowledge will be applied to the teaching and learning process. Assessment for, of and as learning will be done through quizzes, presentations, practical activities and reports from work-based school visits. Checklist to identify critical values and skills, mini projects, jigsaw puzzle, modelling and practical activities will be applied too. Student teachers will be able to demonstrate adequate understanding of the course and will be able to apply it in their practice. The student teachers will have begun to develop the required attitudes and values in their professional career **(NTS 1a, p.12:2c, p13:3e, p14).**

KEY CONTEXTUAL FACTORS

Science is the study of the structure and behaviour of the physical and natural world through observation and experimentation.

Science teaching and learning in pre-secondary school has a myriad of challenges:

- Perceived difficulty of science concepts from both teachers and learners alike because some of the contents do not relate to learners' environment:
    - Emphasis on male domination in the sciences over females.
    - Females perceive science as a difficult subject and thus shy away from it.
    - However, females are perceived as performing better in language use than males and are more careful and meticulous.
- Indigenous knowledge, cultural beliefs and practices contradict the nature of science contents presented by teachers in the classrooms. Also, careers in science are often seen as male careers culturally.
- The use of foreign language (English language) and the lack of the local dialect (L1) equivalents of most science concepts make science learning difficult.
- Pedagogic deficiencies in connecting learning abilities to content presentation (poor PCKs) complicate learners' abilities to form sound scientific concepts and skills.
- There is lack of appropriate teaching –learning resources to support hands -on learning of science.
- The poor performance of students in science makes it necessary that we change the way science is taught at the basic school level. For example,
- findings from standard (national) examinations show that the non-use of practical activities in teaching science has been the cause of students' poor performance in the subject.

However,

- The learners' environment provides primary resources to making science learning relevant, interactive and enjoyable.
- There is extensive literature to make appropriate improvisations and innovations towards improving science learning. Innovations make it easier for every student, irrespective of social, physical and mental ability, to participate in science learning at their own pace.
- There is human resource at the training, supporting and mentoring institutions to build capacity that can drive the intervention that this strand presents.

Children basically learn through play and repetition (KG-P3) and observation (KG –JHS).

- Therefore, learning activities have to be structured in such a manner that all learners will be able to work in free, collaborative and engaging environments to build logical and sequenced concepts from their personal (but guided) experiences. This will imply engaging in integrated teaching- bringing in ideas to facilitate concept formation from various disciplines, cultures and activities.
- Since science is practical, learners must be engaged in hands-on activities, with or without standard laboratories. The introduction of (universal/adaptable) laboratories through micro science kits would be very useful.
- Text and content materials as well as assessment tools must be modelled to take into consideration, the different cultures and gender issues bordering on learning science. The new teacher must be gender responsive and develop an appreciation for those strategies.

CORE AND TRANSFERABLE SKILLS AND CROSS- CUTTING ISSUES, INCLUDING EQUITY AND INCLUSION

The following are the core and transferable skills and cross-cutting issues that must be applied: Critical Thinking, Equity and Inclusivity, Social Collaboration/Team work, Creativity, Innovation, Problem Solving, Manipulation, Reflection, Developing Scientific Process Skills and Inquiry.

Course Learning Outcomes	Learning Indicators
1. Preparations for use of course manual and Pre-Learning interactions. 2. Narrate the evolution of science, indicating the history and contribution of some local and international eminent scientists to science and identify some misconceptions/incorrect scientific ideas about specified science beliefs. (NTS 1f, p.12; 2c, p.13; 3m, p.14). 3. Communicate the basic ideas about the nature, diversity of matter (Particulate nature of matter, Classification of matter), and map out the interactions between matters. Discuss their interconnectivity as well as their effects on the environment using ICT, bearing in mind the diverse nature of learners and their unique strengths (Refer to PD Theme 3, pg 121). 4. Use fundamental quantities and derived quantities that portray the relationship among matter and explain forces and their types. 5. Describe the movement of the Earth that translates into day and night. 6. Show evidence of basic knowledge in pedagogy, literacy and supported teaching (how to teach) and develop the template for professional portfolio, demonstrate values such as critical thinking, patience, precision, accuracy, honesty and orderliness through group and individual practical work and basic ability to work as a professional science teacher in school and to identify their own professional needs in terms of science professional practice, knowledge, values and attitudes (NTS 1d, p.12; 3k, p.14) (NTS 3e, p.14; 1a, p.12) (NTS 2c, p. 13; 3a, p.14). 7. Show evidence of basic knowledge in pedagogy, literacy and supported teaching and develop the template for professional portfolio (NTS 2c, p. 13; 3a, p.14).	• Assembled materials, concept cartoons, and concept maps. • Present concept cartoons, story boards, concept maps that show the chronological evolution of science, some history and contribution of local and international scientists to science and report on some identified misconceptions and how they were corrected (refer to PD Theme 3, pg63,81: PD Theme 3, pg 121). • Constructed story board that shows the diversity of matter. • Provide a conceptual framework of the concept of matter (Solid, Liquid and Gas)/Show models and images that trace the diversity of matter. • Show diverse mind maps that illustrate pathways for changing matter from one state to another. • Develop activities on the interconnectivity among the three states of matter (using water). • Provide a reflective or a critique of YouTube or Computer simulations that explain science interactions(Refer to PD Theme 3, pg 121). • Prepare a list or chart of diverse activities that show that student teachers can identify appropriate measuring units for given quantities. • Provide charts that show the relationship between fundamental and derived units (Refer to PD Theme 3, pg63,81: PD Theme 3, pg 121). • Present simulations and multimedia presentations on types and uses of force. • Prepare descriptions/reflective report with diagrams from student teachers' workbooks about the occurrence of day and night. • Prepare checklist that students used to identify values such as patience, critical thinking, precision and accuracy in a peer review exercise or activity/ Produce list of attributes of a professional science teacher (content knowledge)/ Produce list of attributes of a professional science teacher (attributes such as honesty, carefulness and accuracy. • Sketches or photographs of science teachers at work. • Template of student teachers' portfolio and the necessary requirements or artefacts.

1. Course Content			
Unit/ Week	**Topics**	**Sub-topic (if any)**	**Teaching and learning activity to achieve the learning outcomes**
1	Preparations for use of course manual and Pre – Learning interactions	i. Personal information (Teacher/ Learner). ii. Course expectations. iii. Familiarization with the Course Manual.	√ Self - introduction (teachers and student teachers). √ Breaking Ice with story - telling and sharing experiences. √ Group discussions on course expectations and description of course manual. √ Pre-Reading for week two topic.
2	History of Science – Evolution to modern science	1. Evolution of science (Some processes and products from Stone Age Science to Modern Science). 2. Contribution of eminent scientists (Isaac Newton, Marie Curie, Prof. Allotey, Marian E, Addy, Stephen Hawkins and science teachers in one's school). 3. Expectations of Basic School Science (BSS). 4. Common misconceptions in/ about science.	√ Concept cartoon or story boards that capture the evolution of science inclusive, multi-grade, and developmentally appropriate classrooms. √ (a) Stories about contributions of eminent scientists in Ghana and elsewhere. √ (b) Videos/Role Models to share their experiences (Refer to PD Theme 5, pg 33,37, 57). √ Students discuss their expectations of the basic school science curriculum, vis-à-vis the actual. √ (a) Probing and open-ended questions to identify misconceptions and incorrect ideas in an inclusive, multi-grade, and developmentally appropriate classrooms. √ (b) Use probing questions to explore teacher bias and/or beliefs and how they can impact the learning of science.
3	History of Science in Ghana	Physical science and society ii. Science for environment, health, peace and equity iii. Science Process and Product iv. The Basic School Science curriculum and how it has changed over the years with respect to content and teaching	Concept mapping to explain the connection between science and society and environment (Refer to PD Theme 3, pg63,81: PD Theme 3, pg 121). • Diagrams/photos/charts showing some of the benefits of science. • Concept mapping to explain the process and products of science(Refer to PD Theme 3, pg63,81: PD Theme 3,pg 121). • Independent study on changes that have occurred in the old and new science curriculum with respect to sequencing • Reading preparation on the topic 'Matter' -the first topic.

Unit/ Week	Topics	Sub-topic (if any)	Teaching and learning activity to achieve the learning outcomes
4	Teaching 'Concepts of Matter'	1. Definition of matter 2. Classification of matter (living things & Non-living things) 3. States of matter and change of states (A simple practical model for the three states of matter using water)	• Questioning to identify misconceptions/ incorrect ideas about the concept of matter (Refer to PD Theme 2, pg22). • Concept maps that show the distinction between living and non-living things. in an inclusive, multi-grade, and developmentally appropriate classrooms. • Problem-based peer teaching in groups to develop simple models depicting the states of matter.
5	Safety Precautions in the Laboratory	i. Safety precautions and interpretations of safety symbols ii. Proper handling of chemicals and specimen in the laboratory iii. Importance of first aid and basic resuscitation skills	√ (a) Videos and charts to initiate discussions about misconceptions/ incorrect ideas about safety measures and symbols (Refer to PD Theme 5, pg 33,37, 57). √ (b) Pyramid discussions on general safety precautions in the laboratory. (Refer to PD Theme 3, Pg63,67). √ (c) Mind maps on the interpretation of safety symbols in the laboratory and the school compound. (Refer to PD Theme 3, pg 121). √ a. Story board on proper handling of chemicals and specimen to prevent laboratory accidents. √ b. Modelling appropriate teaching methods to teach 'Safety Precautions in the Laboratory √ Shower thought on the importance of first aid. √ Video/multimedia presentations on basic resuscitation skills (Refer to PD Theme 5, pg 33,37, 57).
6	Course Review 1	i. Reflections, Lesson Audit and Remedial teaching for weeks 1-5 (Refer to PD Theme 1, pg 41).	Peer to Peer Learning activities – peer teaching, peer presentations and seminars with written assessment.
7	Measurement of Physical Quantities	i. Units and quantities of measurement (Fundamental and Derived Quantities and their measuring instruments) ii. Measuring accurately- mass, length, volume (ensuring honesty, carefulness humility, and accuracy)	i. (a) Open-ended questions to elicit misconceptions/incorrect ideas about physical quantities. (b) Practical activities that require the use of measuring instruments (Ensure that different abilities and strengths/needs are catered for to ensure a safe working environment and equal opportunities). ii. Concept mapping of quantities and their instruments of measurement (Refer to PD Theme 3, pg 63,81: PD Theme 3, pg 121).

8	Teaching of Force	1. Definition of force 2. Types of force 3. Uses of force	√ Videos, charts and inclusive-friendly models that portray the concept of force to bring out misconceptions and incorrect ideas on forces (Refer to PD Theme 5, pg 33,37, 57). √ Simulations and multimedia presentations on types and uses of forces in an inclusive, multi-grade, and developmentally appropriate classrooms. √ Practical activities on the application of force in everyday life.
9	Earth movement	i. Rotation and Revolution of the Earth ii. Formation of Day and Night	√ Open-ended questions to identify misconceptions/incorrect ideas on earth movement √ (a) Simulations and multimedia presentations (using iBox) on the occurrence of day and night. √ (b) Role Play on the rotation and revolution of the Earth
10	Child Study styles and self-awareness	i. Children's learning styles and the inquiry approach ii. Self-Awareness conscientisation	√ A Talk on Learning Approaches on Child Growth and Development. (Refer to PD Theme 3, Pg63,67, 91,93, 105,111,135). √ (a) Role Play to demonstrate age level specialism in learning. √ (b) Pyramid discussion to elucidate the concept of self-awareness. (Refer to PD Theme 3, Pg63,67). √ Discussions on Portfolio template.
11	The Basic School Science curriculum	i. Key features of the basic school science curriculum	√ a). Discussions on key features of the basic school science programme such as transitional and age-specific requirements. √ b). Checklist to monitor the Basic School science curriculum issues (e.g. content capability and overload, and whether activities are within the students' age limit).
12	Course Review 2	Reflections, lesson audits and Remedial for weeks 6 – 11(Refer to PD Theme 1, pg 41).	√ Peer to Peer Learning activities – peer teaching, peer presentations and seminars with written assessment.

2. Teaching and Learning Strategies

Shower thoughts, Discussions, Checklist, Talk or Learning Approaches, Role Play Activities, Multimedia Presentations, Concept Mapping, Concept Cartoons, Questioning and Brainstorming, Chart, Pictures and Video Presentations, Simulations and Computer Assisted Instructions.

3. Course Assessment Components

Assessment for, as and of Learning: Documentary evidence should be at least one (1) page long, Mini Report should be one Page long, Model presentations and report presentations should take at least 5mins each for groups of 5 members, these should be collected in the portfolio. The National Teaching Standards (NTS) should be adhered to for each lesson outcome stated.

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

Summary of Assessment Method:)3-hour examination with questions relating to knowledge and understanding of each of the course learning outcomes
Core skills to be acquired: Cognitive, literacy, numeracy, writing and reading
Weighting: 40% (CLO 1 – CLO5)

Component 2: Assessment for Learning Beginning Teaching Science Portfolio

Summary of Assessment Method:
Student teachers submit a beginning teaching professional science portfolio. This should include: list of attributes and values a science teacher should have; photographs or sketches of a science teacher at work with annotations detailing what they show; examples of group and individual practical work from the science lessons and supported teaching; students should identify their key learning and their own professional needs in terms of science professional practice, knowledge, values and attitudes.

The portfolio should show evidence of beginning knowledge of science pedagogy and content and show their beginning ability to work as a professional science teacher in school and to identify.
NTS

1a) Critically and collectively reflects to improve teaching and learning.
1d) Is guided by legal and ethical teacher codes of conduct in his or her development as a professional teacher.
2c) Has secure content knowledge, pedagogical knowledge and pedagogical content knowledge for the school and grade they teach in
3a) Plans and delivers varied and challenging lessons, showing a clear grasp of the intended outcomes of their teaching.
3e) Employs a variety of instructional strategies that encourages student participation and critical thinking.
3k) Integrates a variety of assessment modes into teaching to support learning.

Practical Activities/Reflective Notes/ evidence of values learned/Group work/Evidence of equity and inclusivity/ transferable skills during practical activities
Core skills to be acquired: Honesty, carefulness, accuracy and tolerance,
Weighting: 30% (CLO 1 to 6)
NB: 5% of the weight is reserved for attendance and collaboration during practical activities

Component 3: Assessment as Learning (Peer Review of Reports on school visits and the science curriculum, cross checked by tutors)

Summary of Assessment Method: 1500-word report based on school visits and drawing on learning from science lessons. This should cover: key features of the Basic School Curriculum for Science; how science is taught; challenges to teaching science and considering curriculum issues such as: content capability and overload.
Core skills to be acquired: Pedagogic (How to teach and Assess), observational and cooperative skills
Weighting: 30% (CLO 1, CLO 4, CLO 5 and CLO 6)
NTS
1a) Critically and collectively reflects to improve teaching and learning.
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.

NB: 5% of the weight is reserved for attendance and collaboration during group work and report writing and presentation activities

4. Required Reading List

Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana Association of Science Teachers Integrated Science for senior high schools. Accra: Unimax MacMillan.

Abbey, T. K., & Essiah, J.W. (1995). Ghana Association of Science Teachers physics for senior high schools. Accra: Unimax Macmillan.

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Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.

Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V.& Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.

5. Teaching and Learning resources

Smartphones, Tablets, Productivity tools (software that allow teachers to work better), Subject based instructional tools/applications, Instructional laboratories, Smart boards, projectors, Smart screens, Open ERs – YouTube, Coursera, Khan Academy, TESSA and UNESCO OERs, iBox, and standard laboratories

6. Course related professional development for tutors/ lecturers

See PD Material on Teaching Year 1 Semester 1 Science Course on Integrated Science

LESSON 1

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	1 2 3 4 5 6 7 8 9 10 11 12

Title of Lesson	**Preparations for use of Course Manual and Pre – Learning interactions**	**Lesson Duration**	**3 hours**
Lesson description	The lesson provides the Tutor and Student teacher the opportunity to abreast themselves with what the Course Manual entails, how it will be used and followed to have a successful coursework in the semester. It helps the new Student to interact with the tutor and settles into the new environment thereby initiating an interactive and inclusive atmosphere for the semester course work.		
Previous student teacher knowledge, prior learning (assumed)	Student teachers are familiar with Integrated Science text books and the course outline in the pre-tertiary Science Text Books and Curriculum.		
Possible barriers to learning in the lesson	Initial shocks with the introduction of the New Course Manual, Transition from S.H.S to college.		

Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face**	**Practical Activity**	**Work-Based Learning**	**Seminars**	**Independent Study**	**E-learning opportunities**	**Practicum**
	√				√		

Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face-to-face:** The following will be used as part of the face-to-face approach: discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. **Independent study:** This approach will be used to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development.

Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. **Write in full aspects of the NTS addressed**	• The lesson should help tutor and student teacher obtain personal information about themselves for easy collaboration. • The lesson should outline and introduce to the student teacher, the course expectations from the course manual as well as the essential elements (cross cutting issues, inclusivity and SEN) for the course. • Tutors and Student teachers should Familiarize with the Course Manual and its general content. • Student teachers should be able to determine what to prepare for (advance preparation) the next lesson. • Consider the specific aspects of the NTS that this seeks to address.

• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify which cross-cutting issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed**
	Familiarize with other student teachers and their tutor through socialisation for easy collaboration.	• Student teachers should present a list of profiles of their colleagues and the tutor. (at least names and contacts of five Student teachers/ lecturer)	Diversity Collaboration, Reflection, Communication and Research: Through games, discussions in classroom, perusing the manual (Refer to PD Theme 1, pg 41).
	The lesson should outline and introduce to the student teachers, the course expectations from the course manual as well as the essential elements (Cross cutting issues, inclusivity and SEN) for the course.	• Student teachers make a list of their expectations of the course manual	Sharing ideas in class, the student teachers develop the skills of communication, collaboration and mutual respect why appreciating individual differences and abilities
	Familiarize with the Course Manual	• Student teachers list some unique features of the course manual (examples; Cross cutting issues, SEN, Authentic assessments modes and any other)	Course Manual must be made available to all student teachers; every student teacher must be free to ask questions.
	Determine how to prepare for lessons	• Student teachers identify and list the scope for the next lesson	Action research, critical thinking and responsibility through careful participation in group discussions.

Topic	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher led collaborative group work or independent study.				
Preparations for use of Course Manual and Pre – Learning interactions	Breaking Ice with story - telling and sharing experiences (Misconceptions about teaching Science)	30 minutes	**Face-to-Face:** Tutor introduces the lesson with instructions on stories to share experiences from Science lessons from their previous schools.	**Face-to-Face:** Student teachers share experiences on the science lessons they experienced in their previous schools.
	Self - introduction (teachers and student –teachers	60 minutes	**Face-to-Face:** Tutor describes the Game "Tell it" to student teachers and demonstrates it to introduce him/herself and encourage Student teachers take records of the information from their colleagues and the tutor takes feedback of key points from discussion.	**Face-to-Face:** Student teachers play the game "Tell it" to introduce themselves and provide useful statements about themselves. Students not speaking at any time will take records on their colleagues.
	Group discussions on course expectations and description of course manual	70 minutes	**Face-to-Face:** Tutor initiates discussions with the student teachers on the course expectations and how the manual should be used.	**Face-to-Face:** Student teachers peruse the manual and discuss the structure and expectations of the manual and identify the outline for using the course manual.
	Pre-Reading for week two topic	20 minutes	• Independent Study: Tutor presents an inquiry project to Student teachers to do pre-reading on the next topic – History of Science in Ghana.	• Independent Study: Student teachers scan through the topic in unit 1, seeks clarifications and identify the scope to cover for content and pedagogy.

Which cross-cutting issues will be addressed or developed and how	**Equity and SEN:** through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. Through the game of "Tell it", Student teachers' specific weaknesses and strengths will be identified and catered for.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Class assignment: Student teachers list some of their expectations of the course and the course manual in a one-page write up (non-scoring) as assessment as learning. • Class exercise: Student teachers list some components of the course manual. This will assess them on their appreciation of the use of the course manual as assessment of learning. • Observation test: Self-introduction and profiling helps to assess what Student teachers already know and have experienced. • Students teachers are informed that attendance throughout the course scores 10% of the total formative assessment score of 60%. • NTS 2e: Professional knowledge of students • 2f: Respecting students' linguistic, cultural and socio-economic backgrounds in one's planning and teaching • 2d: Professional knowledge of the frameworks and curriculum • 3a: Managing the learning environment
Teaching Learning Resources	The Course Manual, Flip Charts, Ball, Pens, Pencils, 'A' 4 sheets, markers
Required Text (core)	Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of science teachers integrated science for senior high schools. Accra: Unimax MacMillan.
Additional Reading List	*Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers' physics for senior high schools. Accra: Unimax Macmillan.* *Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for senior high schools. Accra: Unimax MacMillan.* *Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.* *Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V. & Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.*
CPD needs	• *Tutors to be trained in the use of the new course manual and assessment modes for learning, as learning, and of learning, prior to execution of lessons – if they missed the initial training programme. • Training on the game 'Tell It' (Refer to PD Theme 3, pg63,81, 121: PD Theme 5, pg 33,37, 57).

LESSON 2

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	12 3 4 5 6 7 8 9 10 11 12

Title of Lesson	**History of Science – Evolution to modern science**					**Lesson Duration**	**3 hours**
Lesson description	Discussion of evolution of science from the stone age to modern science. This is limited to processes and products within the set period. The lesson outlines the purpose for teaching science as a process and a product.						
Previous student teacher knowledge, prior learning (assumed)	Students are aware of modern scientific innovations. They do not know about stone age processes and products. They have an experience of how science was taught to them before entering college.						
Possible barriers to learning in the lesson	Misconceptions about science- Evolution of man.						
Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face** ✓	**Practical Activity** ✓	**Work-Based Learning**	**Seminars**	**Independent Study**	**E-learning opportunities** ✓	**Practicum**
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face-to-Face:** Discussions and mixed ability group work **Seminar:** Resource person presentation, Report presentation and analysis **Independent Study:** Inquiry Learning to prepare documentary on misconceptions. **e-learning:** Videos, OERs and computer presentations on scientist at work and processes used.						

• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.** • **Write in full aspects of the NTS addressed**	An understanding and appreciation of how far science has evolved from the stone age to modern times. NTS 2c, p.13; NTS 3e, p.14; NTS 1a, p.12.

• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify which cross-cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed?**
	Narrate the evolution of science indicating the history and the contribution of local and international scientist to science and identify some misconceptions of scientific ideas about specific science beliefs	Present concept maps, cartoons, story boards that show the chronological evolution of science (Refer to PD Theme 3, pg63,81: PD Theme 3, pg 121). Present report on eminent scientists' working style and contribution to the growth and development of science.	Values like collaboration, honesty, reporting, communication, tolerance, equity will be learned through whole class, small group, mixed group and individual attention discussions and class teaching. ICT skills are acquired through ICT presentations.

Topic	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher-led, collaborative group work or independent study.				
History of Science	Evolution of Science	60 min	• **Face-to face/ Group Activity:** Teacher puts students in mixed (ability/gender/age) groups and initiate a discussion on the evolution of science.	• **Discussion:** the evolution of science, naming some stone age scientific developments as against modern science, technology and innovations. • Draw/ model for presentation.
	Contribution of Eminent Scientists	60 minutes	• Teacher discusses the lives and activities of eminent scientists with students using video or OERs	• Mini reports of scientists in a chronological order from videos or OERs. • Invited eminent scientist to interact with students/ videos and/or OERs presentation on eminent scientists at work. • Newspaper cuttings/internet resources to show the profiles of eminent scientists.
	Expectations for Basic School Science	30 minutes	• Ask students to discuss in mixed ability groups contents of the BSC as and how they were taught at Basic school • Discussions continue on how learners may currently be taught science at Basic school	• Students in mixed groups make list of topics and how they were taught and present. • Students make suggestions of probable current topics in the BSC for teacher's query.

Topic Title	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
	Common misconceptions in/ about science	30 minutes	• Ask students to mention some misconceptions and how they can be corrected. E.g.: droplets of water on cold bottle, pregnant women don't eat eggs, no sweeping in the night.	• Prepare documentary evidence/report of some identified misconceptions and how they can be corrected.

Which cross-cutting issues will be addressed or developed and how	**Equity and SEN:** through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere including encouraging mixed ability group work.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Assessment for, and as Learning: Classroom group report presentations on evolution and misconceptions for 5 minutes each. • Assessment of learning: Presentations of documentary evidence in their portfolio. • NTS 2c: Secure content, pedagogical and pedagogical content knowledge.
Teaching Learning Resources	Tools for drawing, carving, internet resources, desk/laptop with internet access, smart phones.
Required Text (core)	*Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of science teachers integrated science for senior high schools. Accra: Unimax MacMillan.*
Additional Reading List	*Abbey, T. K., & Essiah, J.W. (1995). Ghana Association of Science Teachers' physics for senior high schools. Accra: Unimax Macmillan.* *Ameyibor, K., & Wiredu, M. B. (2006). Ghana Association of Science Teachers' chemistry for senior high schools. Accra: Unimax MacMillan.* *Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.* *Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V.& Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.*
CPD needs	• See PD Material on Teaching Year 1 Semester 1 Science Course on Integrated Science

LESSON 3

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	12 3 4 5 6 7 8 9 10 11 12

Title of Lesson	**History of Science in Ghana**					**Lesson Duration**	**3 hours**
Lesson description	This lesson deals with the nature of physical science, its effect on society, environment and health.						
Previous student teacher knowledge, prior learning (assumed)	Students are familiar with their environments and some benefits of science.						
Possible barriers to learning in the lesson	Misconceptions about some environmental issues; for example, that diseases are caused by angry gods, while natural disasters are punishments.						
Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face** √	**Practical Activity**	**Work-Based Learning**	**Seminars**	**Independent Study** √	**E-learning opportunities** √	**Practicum**
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face-to-face:** Mixed group discussions and reporting **Independent Study:** Field work, Mini research and report writing **E-Learning opportunities:** Internet based data collection and analysis.						

• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.** • **Write in full aspects of the NTS addressed**	Students should demonstrate understanding of science and society. They should also be able to enumerate the benefits of science with regards to its processes and products. NTS 2c, p.13; NTS 3e, p.14; NTS 1a, p.12

• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify which cross-cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed?**
	Demonstrate understanding of the impact of science on society and the environment.	• List the benefits of science. • Present concept maps, diagrams/photos/charts, and story boards that show the benefits of science to society as well as products of science (refer to PD Theme 3, pg63,81: PD Theme 3, pg 121).	• Values like collaboration, honesty, reporting, communication, tolerance, equity will be learned. • Whole class, small group, mixed group and individual attention, discussions and class teaching.

Topic:	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher-led, collaborative group work or independent study.				
History of Science in Ghana	Physical Science and Society	60 minutes	Put students in mixed groups to observe some environmental phenomena and report on the science behind the phenomena.	Students undertake field walk to identify environmental mishaps such as air pollution, water pollution, chocked gutters and report their implications for sustainability.
	Science for Environment, Health, Peace and Equity	60 minutes	Put students in mixed groups to observe the health, peace and equity status (well-being) that pertain in their environment	Students undertake a mini research on the health, peace and equity situation in their environment (well-being) and report in the form of charts/posters.
	Science Process and Product	60 minutes	Teacher-led discussions on the processes and products of modern science for sustainability	Students do internet-based research and prepare scientific reports in mixed groups

Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Assessment for and as learning: Poster presentations (5mins per group). • Assessment of Learning: 3-Page Report of mixed group work on process and product of sustainable modern science • NTS 1a: Critically, collectively reflect to improve teaching and learning
Teaching Learning Resources	Tools for drawing, internet resources, poster paper, poster colour, desk/laptop with internet access, smart phones,
Required Text (core)	*Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of ..... science teachers integrated science for senior high schools. Accra: Unimax MacMillan.*
Additional Reading List	*Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers physics for senior high schools. Accra: Unimax Macmillan.* *Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for senior high schools. Accra: Unimax MacMillan.* *Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.* *Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V., & Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.* *Zumdahl, S. S., & Zumdahl, S. A. (2009). Chemistry. Belmont, CA: Cengage Learning.*
CPD needs	Scientific report writing; presentation skills; charts/posters (Refer to PD Theme 8 pg 63).

LESSON 4

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	12 3 **4** 5 6 7 8 9 10 11 12

Title of Lesson	**Concept of Matter**					**Lesson Duration**	**3 hours**
Lesson description	Matter is a substance that has inertia and occupies physical space. The three most common states are known as solid, liquid and gas. Evidence of the particle nature of matter is to be discussed and modelled, through theory and experiments. Through classification of matter into solids, liquids and gases, students study the difference of matter in different states and then describe the properties of matter in the three states. Students are then introduced to a simplified version of the particle theory to explain some observed phenomena such as expansion, gas pressure and the density of matter.						
Previous student teacher knowledge, prior learning (assumed)	Lesson 3 dealt with some misconceptions of water droplets on the external surface of a cold bottle that is closed. Students have learnt particulate nature of matter such as elements in the periodic table, metals and non-metals, etc. Common knowledge of water as used in their homes.						
Possible barriers to learning in the lesson	Misconception about matter may arise from how individuals conceptualize matter.						
Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face** √	**Practical Activity** √	**Work-Based Learning**	**Seminars**	**Independent Study**	**E-learning opportunities** √	**Practicum**
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face-to-face:** Discussions, Observation, Demonstrations are used. **Practical Activity:** Modelling Matter changes. **Independent Inquiry:** Reflection and Fieldwork.						

• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.** • **Write in full aspects of the NTS addressed**	• Student teachers discuss their own expectations about the topic, 'Nature of Matter'. • Student teachers discuss their expectation of how their teacher will teach the said topic. • It's important for student - teachers to be able to explain the properties of matter to the basic school learner to distinguish clearly between each type of matter and their different physical characteristics. • Relate the diversity of matter to diversity in the community/universe. • Realize the co-existence of nature and thus encourage cooperation among humans and nature. • It is important for student teachers to identify the particle nature of matter, especially the composition of their bodies. • All everyday objects that can be touched are ultimately composed of atoms, which are made up of interacting subatomic particles, and in everyday as well as scientific usage.

• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify which cross-cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed**
	Explain the nature of matter in simple terms.	Group poster presentation on understanding of matter	• Communication and critical thinking skills. • Enquiry skills.
		Group poster presentation on definition of matter	Reflection, Communication and Research: Through group work and presentation (Refer to PD Theme 1, pg 41).
	Relate Matter to diversity of nature	Present Chart on the interrelatedness of matter in Nature	Diversity is explained and felt in walking round the compound.
	Develop models for teaching States of matter	Present Models for states of matter	Creativity and critical thinking are developed in developing models.

Topic:	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher-led, collaborative group work or independent study.				
Teaching Concept of Matter	Definition of Matter	20 mins	Facilitates and provides the necessary tools for students' activities. Initiates a discussion to review reports from previous lesson on processes and products of Modern Science.	Student teachers respond to questions on their reports and link same to current observable phenomena in the environment.
		20 mins	Pyramid discussion on student teachers' own conceptions about matter.	Same-group/mixed group abilities to present ideas.
		10mins	Brainstorming with student teachers about the source of water droplets on the cold bottle (from lesson 3) (Refer to PD Theme 3, Pg64,73).	Student teachers responds to questions on source of droplets on cold bottle and clarifies misconception (water from within bottle to water vapour cooling on the external surface of cold bottle).
		10mins	Initiates discussion /Talk for learning approach to identify all elements of nature referred to as matter (Refer to PD Theme 3, Pg63,67, 91,93, 105,111,135).	List all matter on card boards as they discuss matter based on identifiable features (space/volume, mass/ substance, weight, etc).
	Classification of matter (living & Non-living things)	20 mins	Group student –teachers according to varied learning abilities to walk round the immediate environment of the classroom and note the surrounding.	Walk round the compound and collect all matter possible and note that which cannot be carried.
		30mins	Allow student teachers collect all matter that can be carried for sorting in class.	Sort all matter collected and arrange according to living and non-living things.
		30mins	Request Student teachers to reflect on the sorting activity and state how that will make basic school learners learn the very sorting concepts in matter.	Student teachers make presentations on sorting with justification (from online resources such as UNESCO OER etc). • ..... Student teachers report on their reflections in same groups (half page each and report duration should be 3mins each) (Refer to

Topic:	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher-led, collaborative group work or independent study.				
		30mins	Request Student teachers to reflect on the sorting activity and state how that will make basic school learners learn the very sorting concepts in matter.	Student teachers make presentations on sorting with justification (from online resources such as UNESCO OER etc). Student teachers report on their reflections in same groups (half page each and report duration should be 3mins each) (Refer to PD Theme 1, pg 41).
	States of matter and change of states (A simple practical model for the three states of matter using water)	40 mins	Demonstrate, practically, how to model the states of Matter for Student teachers Demonstrate simple change of state of matter using candle wax and water	Perform simple activities using demonstrations on modelling of water in groups Observe the simple change of state of Matter

Which cross-cutting issues will be addressed or developed and how	Equity and SEN: through mixed grouping to protect vulnerable Student teachers and establishing an interactive and inclusive classroom atmosphere. Through modelling, collaboration is established.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Assessment of learning: Student teachers make presentations after group work (3 mins per group and 1-page submissions) and model work presentation (5 mins each). • NTS 1a: Critically and collectively reflect to improve teaching and learning. • 1e: Positively engaging colleague learners.
Teaching Learning Resources	Water, Cardboard, UNESCO OERs
Required Text (core)	*Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of science teachers integrated science for senior high schools. Accra: Unimax MacMillan.*
Additional Reading List	*Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers physics for senior high schools. Accra: Unimax Macmillan.* *Ameyibor, K., & Wiredu, M. B. (2006). Ghana Association of Science Teachers Chemistry for senior high schools. Accra: Unimax MacMillan.* *Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.* *Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V.& Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.*
CPD needs	See PD Material on Teaching Year 1 Semester 1 Science Course on Integrated Science

LESSON 5

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	12 3 4 5 6 7 8 9 10 11 12

Title of Lesson	**Safety Precautions in the Laboratory**					**Lesson Duration**	**3 hours**
Lesson description	The lesson provides the Tutor and student teachers the opportunity to abreast themselves with safety precautions in the laboratory (and how they can teach the same principles to their would-be learners) so that they can handle materials in the laboratory with care to avoid accidents during laboratory work. Knowledge that will be gained from the lesson will enable them to appropriately handle hazardous materials/substances they may encounter in the environment.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers studied aspects of safety precautions in the laboratory in senior high school integrated science						
Possible barriers to learning in the lesson	Inadequate handling of the topic at pre-tertiary level						
Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face** √	**Practical Activity** √	**Work-Based Learning**	**Seminars**	**Independent Study**	**E-learning opportunities** √	**Practicum**
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face-to-Face:** Discussion, demonstration, Resource person presentation **Practical Activities:** Role play, and Simulations on CPR **E-learning opportunities:** OERs on CPR and Videos of CPR practice						

• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.** • **Write in full aspects of the NTS addressed**	• The lesson should help tutors and student teachers deepen their knowledge on safety precautions in the laboratory to ensure safety of their future students/pupils during science practical lessons. • The lesson should help the student teacher to be able to interpret safety symbols and labels especially on chemical containers and should be able to follow instructions on the proper use of equipment in the laboratory. • The lesson should equip the student teacher with appropriate skills to handle accidents during practical work in their future science classrooms/laboratories. Knowledge that will be gained from the lesson will enable them to appropriately handle hazardous materials substances they may encounter in the environment.		
• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify which cross-cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed**
	Student teachers should enumerate some purposes for ensuring safety in the science classroom.	Student teachers should submit a chart of reasons for some safety precautions stated.	Reflection, Communication and Research: Through construction of charts (Refer to PD Theme 1, pg 41).
	The student teacher should be able to interpret safety symbols and labels on chemical containers and follow instructions on the use of equipment during practical work.	Student teachers draw and label some safety symbols used on some labels of science equipment and containers.	Develop the skills of construction, aesthetics and critical thinking through drawing and labeling
	The student teacher should be able to handle accidents that may occur during practical work in their future science lessons.	Student teachers demonstrate some accident care and management through role play with their peers.	Developing Social collaboration and attention and care to individual needs (SEN) through role play.
	Designing an activity to make learners learn to take precaution in the science classroom and Laboratories.	Student teachers design activity to enable learners from the basic level of schooling learn to keep safe in the science classroom and laboratories.	Action Research, Critical thinking and responsibility through active participation in group discussions (Refer to Y1S1 of pedagogy extended lesson plan).

Topic	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher led, collaborative group work or independent study.				
Teaching Safety Precautions in the Laboratory	Safety precautions and interpretations of safety symbols	50 min	Presents videos and charts to initiate discussions about misconceptions/ incorrect ideas about safety measures and symbols. Initiates pyramid discussions on general safety precautions in the laboratory. Assist student teachers to draw Mind Maps on the interpretation of safety symbols in the laboratory and the school compound (Refer to PD Theme 3, pg 121).	Student teachers review their knowledge on safety precautions and compare with evidence from the videos and charts. Engage in discussions on safety measures. Student teachers working in groups to develop and present Mind Maps on their interpretation on safety measures and symbols in the laboratory. (Refer to PD Theme 3, pg 121).
	Proper handling of chemicals and specimen in the laboratory	45 minutes	Tutor demonstrate to student teachers how to develop Story Board on proper handling of chemicals and specimen to prevent laboratory accidents.	Student teachers working in groups develop, display and discuss their storyboards on proper handling of chemicals and specimen to avoid accidents.
	Importance of first aid	20 minutes	Tutor to assist student teachers to come out with their Shower thought on the importance of first aid.	Students teachers engage in discourse on importance of first aid in the laboratory and in the school.
	Basic resuscitation skills	65 minutes	Tutor presents basic resuscitation skills using /multimedia Using Instructions on worksheet, tutor directs Student teachers to design activities that will enable learners at the basic schools learn safety precautions. Introduce Resource Person to demonstrate the skills and explain the processes involved.	Student teachers observe and discuss presentations on basic resuscitation skills 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.

Which cross-cutting issues will be addressed or developed and how	**Equity and SEN:** through setting ground rules to protect vulnerable Student teachers and establishing an interactive and inclusive classroom atmosphere. Through the game of "Tell it", student teachers' specific weakness and Strengths will be identified and catered for.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Assessment as learning: Class assignment where student teachers provide a list and interpretation of some of the laboratory safety symbols for assessment. • Assessment for learning: Student teachers provide story board on proper handling of chemicals and specimen and a presentation on the importance of first aid in the laboratory and in the school environment (group presentation for 3 mins each). • Assessment as learning: Student teachers demonstrate basic resuscitation skills in accidental ingestion of chemical solution, burns from hot object, etc (demonstration to last 2mins each). • NTS 1e: Positively engaging colleague learners • 1f: Develop positive teacher identity
Teaching Learning Resources	The Course Manual, laboratory safety manuals, videos on resuscitations, charts on safety symbols and their interpretations, Computer, projectors, Flip Charts, Ball, Pens, Pencils, 'A' 4 sheets, markers.
Required Text (core)	*Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of science teachers integrated science for senior high schools. Accra: Unimax MacMillan.*
Additional Reading List	*Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers' physics for senior high schools. Accra: Unimax Macmillan.* *Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for senior high schools. Accra: Unimax MacMillan.* *Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.* *Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V.& Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.*
CPD needs	See PD Material on Teaching Year 1 Semester 1 Science Course on Integrated Science

LESSON 6

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	12 3 4 5 6 7 8 9 10 11 12

Title of Lesson	**Course Review 1**					**Lesson Duration**	**3 hours**
Lesson description	The review and audit of the lessons for the first half of the semester. It is also expected that student teachers will reflect during this lesson on their own progress in the course so far.						
Previous student teacher knowledge, prior learning (assumed)	Lessons learnt from lesson 1 through lesson 5 in all learning approaches.						
Possible barriers to learning in the lesson	Misconception of some concepts not adequately dealt with. Lessons not appropriately understood by student teachers.						
Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face** √	**Practical Activity** √	**Work-Based Learning**	**Seminars**	**Independent Study** √	**E-learning opportunities** √	**Practicum**
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face-to-face:** Discussion, Demonstration **Independent Study:** Reflections, Modelling concept maps and cartoons **Seminar:** Presentations of models, cartoons and maps of the concepts **e-learning opportunities:** Computer simulations and OERs on content and teaching activities for contents.						

• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.** • **Write in full aspects of the NTS addressed.**	• Ascertain the level of understanding of concepts. • Test various skills and cross-cutting issues. • Provide remedial tuition/tutorials on where necessary. • Correct misconceptions and misinformation. • Build the necessary support going forward on SEN and Gender issue.

• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify which cross-cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed**
	Identify weaknesses and strengths in learning the science lesson for the period under review	Make a list of weaknesses and strengths on poster papers for sharing	Collaborations, Communication and Research through group work and presentations.
	Be able to reflect on lessons learnt so far and state new insights and/ or grey areas needing remedies	Provide a reflection report and answer questions on topics learnt so far through demonstrations and illustrations on a given media. (Refer to PD Theme 1, pg 41).	Equity and Reflection is developed from reflective activities. (Refer to PD Theme 1, pg 41).
	Correct misconception/ misinformation for earlier (lesson 1 – 5) lessons	Present concept maps and/or models linking misconceptions/ misinformation to new insights. (Refer to PD Theme 3, pg63,81: PD Theme 3, pg 121).	Creativity and critical thinking are developed in making models and concept maps. (Refer to PD Theme 3, pg63,81: PD Theme 3, pg 121).

Topic	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher led, collaborative group work or independent study.				
Course Review 1	Reviewing the understanding of the History of Science, History of Science in Ghana, Concept of Matter, Safety Precautions in the Laboratory and Measurement of Physical Quantities	30 mins	Brainstorming with student teachers to identify the weaknesses and strengths in the lessons 2 – 5 (Refer to PD Theme 3, Pg64,73).	Student teachers respond to Tutor questions on weaknesses and strengths.
		90mins	Initiate discussions /Talk for learning approaches using groups (Same ability and then mixed groups) to identify student teachers' strengths and weakness in the lessons learnt so far. (Refer to PD Theme 3, Pg63,67, 91,93, 105,111,135). The groups are provided with checklist on each topic so that they are able to list weakness and strengths.	Working in groups and with the checklist student teachers identify and record all possible weaknesses and strengths in the lessons learnt so far.
	Remedies to course topics	60mins	Group student teachers according to remedy need and provide specific task assistance in the areas on concept needing remedy.	Students work in the special group (Same remedy need group) on tasks to remedy their learning need.

Which cross-cutting issues will be addressed or developed and how	**Equity and SEN:** through mixed and same group work to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. Through modelling and group work, collaboration is established.

Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Assessment of learning in the following activities: • Keep a log of activities within the week to see how students are progressing on earlier lesson outcomes. • NTS 1f: Developing positive teacher identity • 2c: Secure content pedagogical, and pedagogical content knowledge • 3: Professional practice
Teaching Learning Resources	Cardboards, Course manual, Poster paper, Internet
Required Text (core)	*Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of science teachers integrated science for senior high schools. Accra: Unimax MacMillan.*
Additional Reading List	*Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers' physics for senior high schools. Accra: Unimax Macmillan.* *Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for senior high schools. Accra: Unimax MacMillan.* *Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.* *Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V.& Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.*
CPD needs	• See PD Material on Teaching Year 1 Semester 1 Science Course on Integrated Science

LESSON 7

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	12 3 4 5 6 7 8 9 10 11 12

Title of Lesson	**Measurement of Physical Quantities**					**Lesson Duration**	**3 hours**
Lesson description	In this lesson, the tutor and student teachers discuss the measurement of physical quantities, which is the property of an object that can be quantified. For instance, the physical quantities are the length of a rod or the mass of a body, while measurement is the act of comparing a physical quantity with its unit. This lesson will enable Student teachers to appreciate that the value of a physical quantity is obtained by means of measurement.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers have been measuring the lengths and weights of objects with rulers and spring balances respectively in their pre- tertiary science lessons.						
Possible barriers to learning in the lesson	Inadequate and inappropriate devices to be used in measuring objects/things. Student teachers might use different measuring devices in measuring objects/things. For example, using the beam balance in measuring the weight of an object.						
Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face** √	**Practical Activity** √	**Work-Based Learning**	**Seminars**	**Independent Study** √	**E-learning opportunities**	**Practicum**

Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face to Face:** Discussion, Demonstrations for mixed group work **Practical Activities:** Student teacher manipulates/uses some measuring devices in measurements **Independent Study:** Designing Activities for teaching Measurement of Physical quantities.

• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.** • **Write in full aspects of the NTS addressed**	Mention the various quantities and their corresponding units that are measured in science. To enable female student teachers fully enjoy the manipulations in measurements in science. Encourage proper record keeping and ensure accuracy, precision and meticulousness.

• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify which cross-cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed**
	Use fundamental quantities and derived quantities that portray the relationship among matter. Design an appropriate activity to teach measurement of an identified quantity.	Prepare a list/chart of diverse activities that show that student teachers can identify appropriate measuring units for given quantities. Provide charts that show the relationship between fundamental and derived units. Show designed activity for teaching measurement of any identified quantity.	Sharing ideas in class, the Student- teachers develop the skills of communication, collaboration and mutual respect while appreciating individual differences and abilities, critical thinking and responsibility through careful participation in group work/ discussion, well handling of devices, honesty and accuracy.

Topic	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher-led collaborative group work or independent study.				
Measurement of Physical Quantities	Units and quantities of measurement (Fundamental and Derived Quantities and their measuring instruments)	80 minutes	**Face-to-face:** Tutor introduces the lesson by asking i. (a) Open-ended questions to elicit conceptions/ or ideas about physical quantities. For example, using different feet of two students in measuring the lengths of a pair of goal post might not give accurate measure due to different sizes of feet. **Practical Activity:** Student teachers are asked to form groups of 3 members of mixed abilities to perform (Females as leads). (b) Practical activities that require the use of measuring instruments (Ensure that different abilities and strengths/ needs are catered for to ensure a safe working environment and equal opportunities). Concept mapping of quantities and their instruments of measurement. (Refer to PD Theme 3, pg63,81: PD Theme 3, pg 121).	**Face-to-Face:** Student teachers answer open-ended questions to bring their ideas on physical quantities. **Practical Activity:** Student teachers' • List the different types of instruments used for simple measurements. • Mention the type of measurement each instrument is used for. • Use measuring instrument to measure objects/ things and describe how measurements are taken using various instruments. • Mention the different units of measurement used in science. • Differentiate between fundamental and derived units. • Use fundamental quantities and derived quantities that portray the relationship among matter. • Identify the fundamental quantities and their dimensions. Student teachers draw concept maps of physical quantities and their instruments. (Refer to PD Theme 3, pg63,81: PD Theme 3, pg 121).

Topic	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher-led collaborative group work or independent study.				
Measurement of Physical Quantities	Measuring accurately- mass, length, volume (ensuring honesty, carefulness, humility, and accuracy)	60 mins	**Practical Activity:** Tutor demonstrates how to measure physical quantities (mass, length, time, temperature, electric current, volume, density) accurately. **Independent Study:** Tutor describes the process of designing activities for teaching and the process of inquiry learning.	**Practical Activity:** Student teachers practice how to measure physical quantities accurately in groups. **Independent Study:** Working individually, outside the class time, Student teachers design activities on the measurement of any identified quantity for the next lessons.
		40 minutes	**Seminar:** Teacher allows Student teachers to make group Power Point presentations on how to teach measurement of physical quantities at the basic level of education.	**Seminar:** Student teachers make group Power Point presentations on how to teach measurement of physical quantities.

Which cross-cutting issues will be addressed or developed and how	**Equity and SEN:** through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. Through the use of measuring devices to measure objects/things, student teachers' accuracy, honesty and carefulness will be addressed.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Assessment of learning: Student teachers list some physical quantities and their corresponding units. • Assessment as learning: Student teachers do group power point presentations on how to teach measurement of physical Quantities at the basic level. • Assessment for learning: Drawing of concept maps on physical quantity and their units helps to assess what students-teachers have learnt. • NTS 2c: Secure content, pedagogical, and pedagogical content knowledge. • 3i: Explain concepts clearly using examples familiar to students.
Teaching Learning Resources	Beam balance, spring balance, electronic balance, clock, rulers, tape measure, measuring cylinders, Eureka can, ammeter, thermometers, micrometer screw gauge, vernier callipers.
Required Text (core)	*Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of science teachers integrated science for senior high schools. Accra: Unimax MacMillan.*
Additional Reading List	*Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers physics for senior high schools. Accra: Unimax Macmillan.* *Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for senior high schools. Accra: Unimax MacMillan.* *Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.* *Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V.& Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.*
CPD needs	See PD Material on Teaching Year 1 Semester 1 Science Course on Integrated Science

LESSON 8

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	12 3 4 5 6 7 **8** 9 10 11 12

Title of Lesson	**Force**					**Lesson Duration**	**3 hours**
Lesson description	In this lesson, the Tutor and student teachers discuss how to teach the basic concept of force, define it and explore its characteristics. This will help students to get the meaning of a force. Tutor and Student teachers further discuss the types and uses of force. This will lead them to recognize and appreciate that everyday activity like push, kick, squeeze, throw or hit involves the application of force.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers have been pushing various objects to new positions in their homes and schools.						
Possible barriers to learning in the lesson	Possible misconceptions that Student teachers may bring to classroom. For example, it is natural and common sense to assume that a driving force is needed to keep an object moving at a steady speed because that is our everyday experience. When you stop pedaling on a bicycle you come to a gradual stop. Therefore, you need a force to maintain a constant speed.						
Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face** √	**Practical Activity** √	**Work-Based Learning**	**Seminars** √	**Independent Study**	**E-learning opportunities** √	**Practicum**
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face-to-Face:** Discussion, Demonstrations and Questioning. **Practical Activities:** Practice on forces and measuring force, pushing, kicking, squeezing, throwing and hitting of objects to realize the application of force. **Seminar:** Poster presentations on characteristics, types and uses of force. **E-learning opportunities:** OER presentations on uses of force.						

• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.** • **Write in full aspects of the NTS addressed.**	Explain the concept of force. Mention the characteristics of force. Mention some of the usefulness of force. Designing activities to teach force.

• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify which cross-cutting issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed**
	• Explain the concept 'Force'. • State types of force • Describe some application of force in everyday life • Design activities to be used in teaching force	• Role play to demonstrate the concepts – pushing, pulling, lifting • Present charts on types of force • Model some applications of force in everyday life • Designed activities that can be used to teach force	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	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher led, collaborative group work or independent study.				
	Definition of a force	30 minutes	**Face-to-face:** Tutor recaps previous lesson on measurement of the physical quantities with students. **Face-to-face:** Teacher guides student teachers to define force. **E-Learning opportunities:** Teacher guides the student teachers to prepare charts/make videos of activities that portray the concept of force.	**Face-to-face**: Student teachers, in pairs, reflect on previous lessons. Student teachers prepare videos, charts and models to bring out the concepts of force. Student teachers perform activities by pushing objects on less friction and more friction substances to recognize how friction stops moving objects.
	Types of forces	30 minutes	**Face-to-face/Group activity:** Tutor asks student -teachers to form groups of 3 members (in mixed ability) to use simulations and multimedia presentations to describe types of forces (contact forces and non-contact forces).	**Face-to-face/group activity:** Student teachers form groups of 3 members in an inclusive, different age group and developmentally appropriate forms to do presentations on types of forces by simulations and multimedia.
	Uses of force	60 minutes	**Face-to-face:** Teacher allows Student teachers, in pairs, to provide the uses of force	**Face-to-face:** Student teachers, working in pairs, provide uses of forces
		60 minutes	**Face-to-face:** Demonstrates to student teachers how to design activities for teaching forces	Student teachers observe and practice activity design for teaching forces to basic school learners (group poster presentation)

Which cross-cutting issues will be addressed or developed and how	**Equity and SEN:** through setting ground rules to protect vulnerable Student teachers and establishing an interactive and inclusive classroom atmosphere.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Assessment of learning: class discussion on the definition and uses of force • Assessment as learning: Student teachers provide videos on types of forces • Assessment for learning: Student teachers in groups of three members do poster presentations on how to teach forces to the basic school learner • NTS 3i: Explaining concepts using examples familiar to students • 3j: Use of variety of teaching and learning resources including ICT
Teaching Learning Resources	Trolleys, less friction and more friction surfaces, tables, chairs and cardboards Pendulum Bob.
Required Text (core)	*Abbey, T. K., Alhassan, B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of science teachers integrated science for senior high schools. Accra: Unimax MacMillan.*
Additional Reading List	*Abbey, T. K., & Essiah, J.W. (1995). Ghana Association of science teachers' physics for senior high schools. Accra: Unimax Macmillan.* *Ameyibor, K., & Wiredu, M. B. (2006). Ghana Aassociation of science teachers' chemistry for senior high schools. Accra: Unimax MacMillan.* *Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.* *Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V.& Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.*
CPD Requirement	See PD Material on Teaching Year 1 Semester 1 Science Course on Integrated Science

LESSON 9

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	12 3 4 5 6 7 8 9 10 11 12

Title of Lesson	**Earth Movement**					**Lesson Duration**	**3 hours**
Lesson description	Studies on the rotation and revolution of the earth, including the formation of day and night						
Previous student teacher knowledge, prior learning (assumed)	Students have experienced the occurrence of day and night and seasonal changes.						
Possible barriers to learning in the lesson	Students assume that the earth is stationary, while the sun and moon move around it.						
Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face** √	**Practical Activity** √	**Work-Based Learning**	**Seminars** √	**Independent Study**	**E-learning opportunities** √	**Practicum**
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face-to-Face:** Mixed group activities, discussions and, demonstration, observation. **Practical Activity:** role play. **Independent Study:** re**porting.** e-learning Opportunities: OERs and internet resources presentation.						

• **Overarching outcome, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.** • **Write in full aspects of the NTS addressed.**	Students would demonstrate understanding of the principles of the formation of night and day NTS 2c, p.13; NTS 3e NTS 1a, p.12; NTS 2 e, f; NTECF 29, 39-40

• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify the cross-cutting issues- core and transferable skills, inclusivity, equity and diversity. How will these be addressed or developed?**
	Explain some of the misconceptions associated with the movement of the earth, revolution of the earth, and provide appropriate remedies for identified misconceptions.	Produce charts, diagrams, and models that depict the formation of night and day.	**Equity and Inclusivity:** Communication, Critical thinking, Collaboration, Creativity and Problem Solving.

Topic	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher led, collaborative group work or independent study.				
Earth movement	Rotation and revolution of the earth	90 minutes	Teacher uses open-ended questions to elicit student- teachers conception about the rotation and revolution of the earth Engage student teachers in discussion, demonstration and role play	Work in mixed groups to produce models and charts of the formation of night and day and rotation of the earth Student teachers demonstrate the concepts through role play and discuss the movement of the Earth.
	Formation of: i. Night and day ii Seasons	90 minutes	E-learning opportunities: Teacher-led simulations and OER presentations.	Student teachers present simulations and multimedia using OERs. Student teachers use flashlight, footballs/ tennis balls to demonstrate shadows and earth movements (rotation and revolution).

Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Assessment as learning: Class exercise in which Student teachers make Posters/ charts/models on creation/formation of day and night. • NTS 1a: Critically and collectively reflect to improve teaching and learning • 3e: Employs a variety of instructional strategies
Teaching Learning Resources	Tools for drawing, poster paper, poster colour
Required Text (core)	*Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of science teachers integrated science for senior high schools. Accra: Unimax MacMillan.*
Additional Reading List	*Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers' physics for senior high schools. Accra: Unimax Macmillan.* *Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for senior high schools. Accra: Unimax MacMillan.* *Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.* *Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V., & Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.* *Zumdahl, S. S., & Zumdahl, S. A. (2009). Chemistry. Belmont, CA: Cengage Learning.*
CPD needs	See PD Material on Teaching Year 1 Semester 1 Science Course on Integrated Science

LESSON 10

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	12 3 4 5 6 7 8 9 10 11 12

Title of Lesson	**Child Learning Styles**					**Lesson Duration**	**3 hours**
Lesson description	Learning styles of children and the various approaches to learning science						
Previous student teacher knowledge, prior learning (assumed)	From experience student teachers have knowledge that children learn through observation, imitation and play						
Possible barriers to learning in the lesson	Student teachers assume that children who come to school are 'all the same', with no previous knowledge about school-based content knowledge that must be 'filled' up with such knowledge.						
Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face** √	**Practical Activity**	**Work-Based Learning**	**Seminars**	**Independent Study**	**E-learning opportunities**	**Practicum**
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Mixed group discussions and reporting, observation, role play, situational analysis.**						

• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.** • **Write in full aspects of the NTS addressed.**	Students would role-play different learning styles and reflect on them in pairs/groups (taking into consideration issues of inclusivity, gender and ability). NTS 2c, p.13; NTS 3e NTS 1a, p.12; NTS 2 e, f; NTECF 29, 39-40

• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify which cross-cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity.**
	Demonstrate understanding of different learning styles as pertains among children Understand how children develop and learn in diverse contexts and apply this in their teaching (Knowledge of learners)	Micro teaching, Reflective Report, Building a portfolio on activities in the class, reflections (Refer Pedagogy Expanded Lesson planner for Y1S1) (Refer to PD Theme 1, pg 41).	**Equity and Inclusivity:** Social collaboration, innovation, communication, critical thinking, creativity, problem solving and deduction

Topic:	**Sub-Topic:**	**Stage/ time**	**Teacher Activity**	**Student Activity**
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher led, collaborative group work or independent study.				
Child study styles and self-awareness	Children Learning Behaviour	60 minutes	Face-to-face: Teacher-led discussion on how child learn science and science study styles	Student teachers discuss the psychology of how children learn science and science study styles.
	Self-awareness conscientisation	80 minutes	Put students in mixed groups to discuss and share their lived learning experiences	Pyramid discussion to elucidate the concept of self-awareness (Refer to PD Theme 3, Pg63,67).
	Concept of a portfolio	40 minutes	Teacher-led discussions on how to build a portfolio.	Discussions on a template for a portfolio.

Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Assessment for Learning: In a class exercise, Student teachers make a list of their lived experiences and self-awareness • Assessment as learning: Teacher listen to and observe a group presentation of 3 mins each of the student teacher ideas for developing portfolios • NTS 1b: Improves personal and professional development through lifelong learning • 1f: Develop a positive teacher identity and act as a good role model for students • 3i: Listens to learners and gives constructive feedback
Teaching Learning Resources	Tools for drawing, poster paper, poster colour
Required Text (core)	*Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of science teachers integrated science for senior high schools. Accra: Unimax MacMillan.*
Additional Reading List	*Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers physics for senior high schools. Accra: Unimax Macmillan.* *Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for senior high schools. Accra: Unimax MacMillan.* *Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.* *Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V., & Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.* *Zumdahl, S. S., & Zumdahl, S. A. (2009). Chemistry. Belmont, CA: Cengage Learning.*
CPD Requirement	• See PD Material on Teaching Year 1 Semester 1 Science Course on Integrated Science

LESSON 11

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	12 3 4 5 6 7 8 9 10 **11** 12

Title of Lesson	**The Basic School Science Curriculum**					**Lesson Duration**	**3 hours**
Lesson description	In this lesson, the tutor and student teachers will study the new basic school curriculum. This lesson will enable student teachers to identify main features of the basic science curriculum. The student teachers will be equipped with knowledge of main components of the curriculum and how they are aligned. They will acquire analytical skills to evaluate basic science curriculum materials in later years.						
Previous student teacher knowledge, prior learning (assumed)	Student teachers have experienced the basic science curriculum (syllabus) at the primary school, through their teachers' instructions						
Possible barriers to learning in the lesson	Student teacher might be seeing the basic science curriculum (syllabus) for the first time and may experience conflicts between their prior expectations and the actual.						
Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face** √	**Practical Activity**	**Work-Based Learning**	**Seminars**	**Independent Study**	**E-learning opportunities**	**Practicum**
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face-to-Face:** Discussion, Talk for learning approaches with student teacher presentations.						

• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.** • **Write in full aspects of the NTS addressed.**	• The lesson should help tutor and student – teachers deepen their knowledge on basic school science curriculum (syllabus). • The lesson should help the student teacher to be able to prepare a checklist to identify and evaluate main features of the basic science curriculum (syllabus). • The student teachers would develop a checklist that align the main features of the basic school science curriculum (syllabus) which would be used in future to monitor curriculum issues of implementation, overload, curriculum activities and age limits of pupils, etc.

• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify which cross-cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity.**
	Describe main features of the basic science curriculum.	Student teachers should submit a Chart of main features of basic science curriculum.	Student teachers develop skills of communication, collaboration and mutual respect and appreciation of individual differences and critical thinking.
	Prepare a checklist to investigate alignment among the main features such as objectives, content, activities, assessments and cross-cutting issues of the basic science curriculum (syllabus)	Student teachers provide a checklist of the main features and their alignment.	Develop skills for construction of checklists, and analysis of curriculum materials.
	Prepare checklist to monitor curriculum issues	Student teachers in groups prepare checklist to monitor curriculum issues.	Developing Social collaboration and attention and care to individual needs (SEN) through role play.

Topic	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher led, collaborative group work or independent study.				
Basic school science curriculum	Key features of the basic school science curriculum	60 minutes	Tutor introduces the lesson by asking open-ended questions to elicit student teachers' ideas about the basic science curriculum as transition requirement and age.	Student teachers in groups to share their ideas on the basic school curriculum.

Topic	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
	Alignment among main features of the curriculum (curriculum goals. Content, learning objectives, process skills, assessment strategies)	60 minutes	Tutor to assist student teachers to develop checklist to align the main features of the basic science curriculum (syllabus).	Student teachers to work in groups to establish alignment among the main features of the basic science curriculum and make presentations for discussion
	Checklist for use during school visit to monitor issues of basic school science curriculum (implementation, content capability and overload and whether curriculum activities are within the age limit of pupils).	60 minutes	Tutor to assist student teachers to develop a checklist for future use to monitor the basic science curriculum issues during visits to basic schools.	Student teachers in groups develop Checklist to monitor the Basic School Science Curriculum issues (e.g. curriculum implementation content capability and overload, and whether activities are within the pupils' age limit).

Which cross-cutting issues will be addressed or developed and how	**Equity and SEN:** through setting ground rules to protect vulnerable student teachers and establishing an interactive and inclusive classroom atmosphere. Through the game of "Tell it", student teachers' specific weakness and strengths will be identified and catered for.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Assessment for Learning: Class exercise in which student teachers will provide a one-page list of main features of basic science curriculum • Assessment as Learning: Home work in which Student teachers develop a two-page checklist to monitor curriculum issues (curriculum implementation, content capability and overload and whether curriculum activities are within age limits of pupils, etc.) in future. • NTS 1d: Guided by legal and ethical codes of conduct in their development as professional teachers • 2a: Demonstrate familiarity with the educational system and keep policy guiding it • 2d: The teacher knows the curriculum for the years appropriate to multigrade classes
Teaching Learning Resources	The Course Manual, Computer, projectors, Flip Charts, Pens, Pencils, 'A' 4 sheets, markers.
Required Text (core)	*Curriculum Research Development Division [CRDD] (2007). Teaching syllabus for natural (primary 1-3), Accra: Ministry of Education.* *CRDD (2007). Teaching syllabus for integrated science (Primary 4-6), Accra: Ministry of Education.* *CRDD (2007). Teaching syllabus for integrated science (Junior High School), Accra: Ministry of Education.*
Additional Reading List	*Yeboah, S. K., Ahordji, & Mensah, S. K. (2016). Science for primary schools: Pupil's book 5, Accra: Sam-Woode Ltd.* *Available Primary and Junior high school science textbooks.*
CPD Requirement	Training on content analysis of curriculum materials (syllabuses, textbooks, work books and teachers' guides) and monitoring of basic school science curriculum implementation issues (Refer to PD Theme 5 pg 63-65, 102).

LESSON 12

DUPLICATE THE PLANNER FOR EACH LESSON

Plans for each lesson in the semester.
The following format should be completed for each lesson in the semester.

Year of B.Ed.	1	**Semester**	1	**Place of lesson in semester**	12 3 4 5 6 7 8 9 10 11 12

Title of Lesson	**Course Review 2**					**Lesson Duration**	**3 hours**
Lesson description	The review and audit the lessons for the second half of the semester (from lesson 6). It is also expected that student teachers will reflect during this lesson on their own progress in the course.						
Previous student teacher knowledge, prior learning (assumed)	Lessons learnt from lesson 6 through lesson 11 in all learning approaches.						
Possible barriers to learning in the lesson	Misconception to some concepts not adequately dealt with. Lessons not appropriately understood by Student teachers.						
Lesson Delivery - chosen to support student teachers in achieving the outcomes	**Face-to-face** √	**Practical Activity**	**Work-Based Learning**	**Seminars** √	**Independent Study** √	**E-learning opportunities** √	**Practicum**
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face-to-face:** Discussion, Demonstration **Independent Study:** Reflections, Modelling concept maps and cartoons **Seminar:** Presentations of models, cartoons and maps of the concepts **e-learning opportunities:** Computer simulations and OERs on content and teaching activities for contents.						

• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.** • **Write in full aspects of the NTS addressed.**	• Ascertain the level of understanding of concepts. • Test various skills and cross – cutting issues. • Provide remedial tuition/tutorials on where necessary. • Correct misconceptions and misinformation. • Build the necessary support going forward on SEN and Gender issues.

• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for each learning outcome**	**Learning Outcomes**	**Learning Indicators**	**Identify which cross-cutting Issues, core and transferable skills, inclusivity. Equity and addressing diversity. How will these be addressed or developed**
	Identify weaknesses and strengths in learning the science lesson for the period under review	Make a list of weaknesses and strengths on poster papers for sharing	Collaborations, Communication and Research: Through group work and presentations.
	Be able to reflect on lessons learnt so far and state new insights and/ or grey areas needing remedies	Provide a reflection report and answer questions on topics learnt so far through demonstrations and illustrations on a given media (Refer to PD Theme 1, pg 41)	Equity and Reflection is developed from reflective activities (Refer to PD Theme 1, pg 41).
	Correct misconception/ misinformation for lessons (lesson 6 – 11)	Present concept maps and/or models linking misconceptions/ misinformation to new insights (refer to PD Theme 3, pg63,81: PD Theme 3, pg 121).	Creativity and critical thinking is developed in developing models and concept maps (refer to PD Theme 3, pg63,81: PD Theme 3, pg 121).

Topic:	Sub-Topic:	Stage/ time	Teacher Activity	Student Activity
Teaching and learning to achieve learning outcomes: Depending on delivery mode selected; teacher led, collaborative group work or independent study.				
Course Review 2	Reviewing the understanding of the lesson Force, Earth Movement, Child Learning Styles and Awareness, and the Basic school Science Curriculum	30 mins	• Brainstorming with student teachers to identify the weaknesses and strengths of student – teachers in the lessons 6 – 11. (Refer to PD Theme 3, Pg64,73)	• Student teachers respond to Tutor questions on weaknesses and strengths
		90 mins	• 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. (Refer to PD Theme 3, Pg63,67, 91,93, 105,111,135). • The groups are provided with checklist on each topic so that they are able to list weakness and strengths.	• Working in groups and with the checklist student teachers identify and record all possible weaknesses and strengths in the lessons learnt so far.
	Remedies to course topics	60mins	• Group student teachers according to remedy need and provide specific task assistance in the areas on concept needing remedy.	• Students work in the special group (Same remedy need group) on tasks to remedy their learning need.

Which cross-cutting issues will be addressed or developed and how	**Equity and SEN:** through mixed and same group work to protect vulnerable Student teachers and establishing an interactive and inclusive classroom atmosphere. Through modelling and group work, collaboration is established.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	• Assessment of learning in the following activities: • Keep a log of activities within the week to see how students are progressing on earlier lesson outcomes. • NTS 1f: Developing positive teacher identity. • 2c: Secure content pedagogical, and pedagogical content knowledge. • 3: Professional practice.
Teaching Learning Resources	Cardboards, Course manual, Poster paper
Required Text (core)	*Abbey, T. K., Alhassan, M. B., Ameyibor, K., Essiah, J. W., Fometu, E., & Wiredu, M.B. (2008). Ghana association of science teachers integrated science for senior high schools. Accra: Unimax MacMillan.*
Additional Reading List	*Abbey, T. K., & Essiah, J.W. (1995). Ghana association of science teachers physics for senior high schools. Accra: Unimax Macmillan.* *Ameyibor, K., & Wiredu, M. B. (2006). Ghana association of science teachers' chemistry for senior high schools. Accra: Unimax MacMillan.* *Asabere-Ameyaw, A., & Oppong, E. K. (2013). Integrated science for the basic school teacher I. Winneba: IEDE.* *Oddoye, E. O. K., Taale, K. D., Ngman-Wara, E., Samlafo, V.& Obeng-Ofori, D. (2011). SWL integrated science for senior high schools: Students book. Accra, Ghana; Sam-Woode Ltd.*
CPD needs	See PD Material on Teaching Year 1 Semester 1 Science Course on Integrated Science