YEAR 2

SEMESTER 1

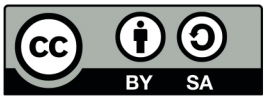
Four-Year B.Ed. Course Manual

MATHS: THEORIES IN LEARNING

GHANA TERTIARY EDUCATION COMMISSION

NATIONAL TEACHING COUNCIL
NTC
Building Confidence, Raising Teaching Standards

The Government of Ghana



FOREWORD

These initial teacher education course manuals were developed by a team consisting of members from colleges of education, and four universities namely, university of Ghana, Kwame Nkrumah university of science and technology, university of education, Winneba, and university of development studies. this team was constituted to support the delivery of the new B.Ed. curriculum as part of Ghana's teacher education reforms supported by T-Tel with assistance from UK aid and overseen by the National Council for Tertiary Education (NCTE).

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 (NTS), thus enabling them to teach effectively in basic schools.

The structure and sequence of the manuals follows a process developed through a collaboration by key stakeholders. The first section is focused on the course information and vision for the new four-Year 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 which will be addressed through the course. 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. The relevant aspects of the national Teachers' standards to be assessed through each assessment are identified. each course is accompanied by the required reading and reference lists 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.

In all, there are 12 lessons for each course manual. The set of first year manuals present the general courses for the beginning teacher. The second, third and final year manuals deal with specialisms and specialist programmes for student teachers. The different manuals for each successive year cover beginning teaching, developing teaching, embedding teaching, and extending teaching.

field instructions to guide supported teaching in school are integrated into the course manuals to provide the student teacher with the nucleus of practicing and developing teaching throughout the entire period of study to be able to meet the requirements of the 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, assessment Policy and inclusion Policy. This will help to ensure that learning by student teachers' is integrated within the wider teacher education policy framework.

Professor Mohammed Salifu Executive Secretary

National Council for Tertiary Education

ACKNOWLEDGEMENTS

The course Manuals were developed over several months 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 of development studies. they were produced in association with the national council for tertiary education 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 national council for Tertiary education, (NCTE) 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, Prof. Mohammed Salifu the executive secretary of NCTE and Mr. Jerry Sarfo the coordinator for the colleges of education, who in diverse ways supported during the course Manual writing workshops.

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

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INTRODUCTION TO COURSE MANUALS

Welcome to this B.Ed. Course manual.

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

The manuals serve the following purposes:

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

Specifically, they also:

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

Who are course manuals for:

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

USING THIS MANUAL

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

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

My teaching philosophy is ……..

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

Mathematics Course Manual

Resources for Course Manual Writing

- Soft copies of the CWG, New Four-Year B.Ed. Curriculum introduction
- Soft and hard copies of the course specifications for the subject for year one and two
- Soft and hard Course Manual Writing Guide (CMWG)
- Relevant subject texts

Target Audience

- College of Education Tutors

Teacher Education University Lecturers

- Student Teachers
- Mentors

The purpose of course manuals

- To provide a lesson by lesson overview of the course, building on, adapting and developing the material in the course specifications
- To provide a resource to support professional development sessions for tutors/lecturers on how to plan for and teach courses from the New Four-Year B.Ed. Curriculum
- To inform tutors /lecturers, student teachers and others working with student teachers about:
  - ✓ what is to be taught and why
  - ✓ how it can be taught
  - ✓ how it should be assessed
- To support consistency in the implementation of the New Four-Year B.Ed. across institutions who train teachers
- To ensure that all **training** information on skills, processes, and other information necessary to perform the teaching taskare together in one place.
- To operationalize the Teacher Education Reform Policy; the requirements of the NTS & NTECF and the Four-Year B.Ed.

Guiding principles of course manual writing

- They are written with the learner, the student teacher, in mind: what they will *be able* to cope with and only include what student teachers need to know, understand, be able to do and be as a basic school teacher
- They take in to consideration the learner's, the student teacher's, context and possible barriers to, and enablers for, learning
- They are written with the tutors /lecturers who are going to teach the course in mind. Tutors must be able to adapt and develop the plans in course manuals to fit the context they are teaching in and to support their teaching
- They are aligned to the key principles and practices of the Teacher Education Reform Policy: the NTS, the NTECF and the New Four-Year B.Ed.
- They are written to provide opportunities for student teachers to develop and apply knowledge during supported teaching in school
- They are written to reflect the stage of student teacher development, set out in the model for progress in the New Four-Year B.Ed.
- They are written to support progress in student teacher learning, including building on prior learning from the previous programme or course/s and supporting progress to the next course.
- They are to be used as self-study tools.
- They are written to have the following characteristics: easy to read; uses active voice and avoids jargon; uses bullet points to offset text; uses images

What a teacher educator needs to know, understand and use to inform what they do

- The aims and structure of the education system and Education strategic Plan
- The Basic School Curriculum
- The Inclusion Policy
- The teacher education system: The National Teacher's Standards, the vision for teacher education and the core principles of the New Four-Year B.Ed.
- Andragogy, effective methods and practices for teaching adult learners

- Assessment Literacy. Assessment for, of and as learning -Educative Assessment

Guidance for completing the course manual writing format: two sections

A. Course Information

Title Page

- Course name: as in course specification unless important reason why not
- 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. In doing this to instil in new teachers the Nation's core values of honesty, integrity, creativity and responsible citizenship and to achieve inclusive, equitable, high quality education for all learners. ''

Course Details: as in course specification unless important reason why not						
Pre-requisite/s	**The programme / previous semester courses studied.**					
Co-Requisites	**Links to other courses being taught, support coherence in student experience and avoid duplication**					
Course Level		**Course Code**		**Credit Value**	**3**	

Table of contents

Each manual will include:

- The goal for the subject or learning area
- Course description
- Key contextual factors
- Core and cross cutting issues, including equity and inclusion
- Course Learning outcomes
- Course content
- Teaching and learning strategies
- Course Assessment components
- Reading and reference list
- Handouts, power points and other resources for lessons
- Plans for each lesson in the semester

A. Course information

Goal for the Subject or Learning Area

This can be found in subject goal document. It should be a short statement which captures what new teachers will know, understand and be able to do in this subject at the end of their training. This statement should be linked to achieving the vision for the curriculum.

Key contextual factors

This can be found in the course specification. It should address what needs are to be considered to reflect the Ghanaian context at local and national levels.it includes potential knowledge and skills gaps and any specific: gender, cultural, linguistic, conceptual, infrastructural issues, for example, that might be barriers to learning for student teachers and eventually basic school children? E.g. issues of subject related bias that need addressing. Potential barriers to learning must be explicitly addressed to enable student teachers to achieve the learning outcomes.

Course Description

This can be found in the course specification. This brief statement should provide a clear understanding of what studying this course involves, what student teachers will get out of studying this course.

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

This can be found in the course specification. Which core and transferable skills or cross cutting issues will be applied or developed through this course? This needs to be made explicit to student teachers. Are there specific issues to do with equity and inclusion which must be addressed so that all student teachers can fully take part? For example, issues related to gender and mathematics or science.

Course Learning Outcomes	***Learning indicators***
These are in the course specification. The course learning	• Measurable/assessable/observable performances

outcomes should specify the expectations of what the student teachers will know, understand and be able to do at the end of the course ***not*** what student teachers will do **on** the course. They must be appropriate and realistic to the learner's abilities, experience, the identified level of the course and *content.* They must be measurable – allowing assessment of student teacher achievement	that provide evidence of learning or other changes taking place in student teachers' behaviour which demonstrate that they have met the learning outcome/s. • What the student teacher will need to do to show they have achieved the learning outcome. (in an inclusive lesson, this should vary and be responsive to student teacher's individual characteristic)
Course content	
In the course specification. This should provide an outline of the academic and / or practical content of the course. It should be clear how this content relates to the achievement of the intended learning outcomes. The name of each unit in the course should be *briefly* set out – the name should make it clear what the unit is about.	

Unit	**Topic**	**Sub-topic (If any)**	**Teaching and learning activities to achieve the learning outcome**
Course Assessment Components			
In the course specification. The NTS and the NTECF require a move away from largely examination-based assessment to strategies to enable assessment of student teachers' skills, knowledge and understanding against the learning outcomes and through these the against the NTS • There should be a maximum of 3 assessment components per 3 credit-course; to avoid over loading student and tutors/ lecturers • The learning outcomes to be assessed by each assessment component should be identified. • Each assessment component should explicitly reference the NTS or aspects of the NTS it will assess. • Each assessment component should include: ✓ The category or type, for example: written, coursework or practical, teaching, examination, collaborative project or presentation, poster, TLM ✓ The type of assessment: of, for and /or as. ✓ An indication of the size of each assessment component (e.g. duration of exams, word limit of written submissions, length of presentations; whether presentations have an individual or group etc.). ✓ The weighting of each assessment component should be expressed as a % of total course mark (overall in each course: 60% continuous assessment of course work, 40% examination of course work). • Each assessment should be manageable and relevant to supporting the student teachers' development. The guidance on assessing student teachers from the NTS, the NTECF the CWG and the New Four Year B.Ed. should be used.			
Teaching and learning strategies			
Detail in this section should show how the total learning hours will be used to achieve the intended learning outcomes, to provide a guide to the teaching and learning strategies to be used. Each teaching strategy should be selected as most appropriate to achieving the learning outcomes. This may include team teaching or additional tutors. As stated in the B.Ed. experiential learning and interactive teaching approaches are encouraged			
Required Reading and reference list			
One or two compulsory texts which must be made available to the student teachers and a SHORT list of 5 relevant references. These lists should be annotated with the key value of each text. Use APA style of writing.			
Teaching and Learning Resources			
Instructional resources required to support learning during the course e.g.: TLMs, lab and workshop equipment, videos, projectors			
Course related professional development for tutors/ lecturers			
This is not included the course manual but professional development needs must be identified to ensure all tutors / lecturers are prepared to teach the course identify any specific topics or issues which may be challenging for tutors / lecturers.			

Lesson 1

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

Title of Lesson	Why do we teach mathematics in school?	**Lesson Duration**	**3 Hours**
Lesson description	This lesson focuses on developing an understanding of what we know about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers children's developmental stages, how children learn mathematics and associated theories, and other psychological factors influencing learning. Another area that is considered is developing awareness of equity and diversity. Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts based on child growth, development, and maturation which will be employed in the new strand. This first lesson introduces student teachers to the course learning outcomes in the three assessment components of the course.		
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts based on child growth, development, and maturation;		
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.		

Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☒	**Work-Based Leaning** ☐	**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:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities* –** involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	The purpose of the lesson is to; • Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. • develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to Junior High School learners.

• **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 knowledge and skills of observation and reporting on class teaching and wider school activities **(in School 1)** *(College & School induction*	**Inclusion and Equity** • Produce well-prepared induction schedule and procedures and provide records of group work activities	• Inclusion and Equity: by supporting student teachers to recognize institutional and personal sources of barriers to leaning and making conscious efforts to address them.

	by tutors, school heads, lead mentors and mentors) Demonstrate knowledge and understanding of the key features of the basic school curriculum (BSC); and specifically focusing on core subjects and their associated expected learning outcomes (NTS, 2a). Demonstrate skills in preparing and writing a personal teaching philosophy statement (NTS, 1f)	and/or cooperative learning for student teachers during observations • Show records of specific observations from wider school environment and induction and Report on small group discussions with mentors and peers on the key features of the official basic school curriculum • Provide a write-up of the beginning teacher's self-awareness, beliefs, and values of teaching and learning (personal teaching philosophy) • Make oral presentations of knowledge gained during induction and observation by student teachers in their groups.	• Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning • Support student teachers the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination) • Communicative skills of student teachers: can be enhanced through the examination, interrogation and presentation. • Digital literacy**:** can afford student teachers the opportunity to develop records for reflective journals using digital tools.

Topic	**Sub-topic(s)**	**Stage/ Time**	**Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative group work or independent.**	
			Teacher Activity	**Student Activity**
WEEK 1 **Why do we teach mathematics in school?**	Definition and importance of Mathematics to the Junior High School teacher	**40 mins**	Introduces student teachers to the Course Manual and discuss the various components including assessment procedures **(See** Course Assessment Components**),** ***(PD Theme 1)***	Participate in the discussion of various components of the course manual, take opportunity to ask questions about the Course Manual including assessment procedures. Outline their expectations and views about the mathematics course.
		20 mins	Introduce the lesson by giving a historical account of how mathematics was used by various generations and how it has been used to solve problems in different parts of the world, generations after generations; ***(PD Themes 1 &3)***	Listen attentively to the tutor or lecturer's verbal exposition and ask questions for clarification or provide comment(s) to ensure participation and understanding;
		20 mins	Engage student teachers in a discussion based on how mathematics is used currently and its future prospects ***(PD Themes 1& 3)***	Engage in a think-pair-share session to outline the importance of Mathematics to people in various trades and professions in our Ghanaian

	How does Mathematics relate to society? What does it mean to learn and teach Mathematics?	**20 mins** **20 mins** **20 mins** **20 mins**	Assign student teachers to explore the meaning and definition(s) of Mathematics through internet search and to discuss their findings; ***(PD Themes 3 & 4)*** Monitor student teachers as they search the internet for definitions of Mathematics and to refine any potential distortions or misconceptions in their narrations; (***PD Theme 1)*** Poses the question "How does Mathematics relate to society?" ***(PD Theme 2)*** Use Power point presentation interspersed with questioning to discuss opposing views of how young children learn or develop certain Mathematical concepts; ***(PD Themes 1 & 3)*** Assign student teachers to write a reflective paper on "What does it mean to learn and teach Mathematics?,as a consolidation exercise to be presented in the next lesson. ***(PD Theme 1)***	cultural settings; Search the definition(s) and meaning of Mathematics on the internet and to discuss their findings to their findings in groups of five or six. Alert peers of distortions of facts and principles as they present their findings; Use appropriate ICT tools to record teacher-pupils' classroom interactions and wider school activities in SR Js Engage in a group discussion to explore the application of Mathematics in the Ghanaian society. This discussion should also consider how our cultural practices and artefacts can be used in teaching of school mathematics in the Junior High School; Pay attention to and also participate in the discussion of their own perception of how Mathematical concepts are learned Use appropriate ICT tools to record teacher-pupils' classroom interactions and wider school activities in SRJs Read further about what it means to reflect on the historical development of the numeration system and the contributions of different civilizations and cultures have made until the emergence of the Hindu-Arabic base ten system
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	1. Student teachers to discuss build their professional teaching portfolios (PTP) to be presented at end of the 11th week of the semester. 2. Student teachers are assigned to write a short reflective paper, maximum one page, on the influence of a teacher's values and philosophy of mathematics on how adolescents learn mathematics (Assessment as learning) NTS 1a- Critically and collectively reflects to improve teaching and learning. This will be included in the professional teaching portfolios (PTP) NTS 3j - Produces and uses a variety of teaching and learning resources including ICT, to enhance learning.NTS 3h - Sets meaningful tasks that encourages learner collaboration and leads to purposeful learning			
Instructional Resources	Posters; video clips; downloads; models, etc.			

Required Text (core)	Sriraman, B., & English, L. (2005). Theories of mathematics education: A global survey of theoretical frameworks/trends in mathematics education research. ZentralblattfürDidaktik der Mathematik (International Reviews on Mathematical Education), 37(6), 450–456.
Additional Reading List	Lakoff, G. &Núñez, R. E. (2000). *Where Mathematics comes from*. New York: Basic Books. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra: Unimax Publishers. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers.
CPD Needs	• How to design and/or use some innovative materials and ideas for teaching selected concepts based on theories of learning in Junior High School mathematics. • How to manage transition of home to school. • Understand the various characteristics and uniqueness of Junior High School learners. • How to design tasks for assessment procedures forassessment of, as and for learning. • Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports.

Lesson 2

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

Title of Lesson	Teacher beliefs about mathematics and their relation to teaching				**Lesson Duration**	**3 Hours**	
Lesson description	This lesson focuses on developing an understanding of what we know about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores trainee teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers children's developmental levels, how children learn mathematics and associated theories, and other psychological factors influencing learning. Student teachers will be led to share their views of equity and diversity issues in the teaching of mathematics.						
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts based on child growth, development, and maturation; Student teachers have been introduced to the nature and importance of mathematics						
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.						
Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☒	**Work-Based Learning** ☐	**Seminars** ☒	**Independent Study** ☒	**e-learning opportunities** ☒	**Practicum** ☐
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	**Face-to-face:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities*** – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.						
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	**The purpose of the lesson is to;** • audit content knowledge and experiences of student teachers to establish and address their learning needs, perceptions and misconceptions about the learning and teaching of numeracy in Junior High School • develop student teachers' awareness of howteachers' beliefs about mathematics can influence their teaching						
• **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 knowledge and understanding of different perspectives (beliefs and values) of mathematics		• Outline and analyse different perspectives on mathematics and discuss their differences and similarities; • Describe conceptions about mathematics implicit in their own beliefs; and personal beliefs about the teaching and learning of mathematics;		• Inclusion and Equity: by supporting student teachers to recognize institutional and personal sources of barriers to leaning and making conscious efforts to address them.		

	• Demonstrate an understanding of relevant professional values and attitudes in teaching Junior High School mathematics	• Reflect critically on their own learning experiences and use the skills gained to plan for continuous personal and professional development • Outline relevant professional Values, as well as, show how respect for equity and inclusivity can promote effective learning in the Junior High School mathematics classroom	• Characteristics and uniqueness of JHS learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning • Inclusion and Equity: by recognizing institutional and personal sources of barriers to leaning and making conscious efforts to address them. Professional development: Developing understanding of NTS through conscious effort and support from mentors, peers, and tutors. • Support student teachers the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination)

Topic	**Sub-topic(s)**	**Stage/ Time**	**Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative groupwork or independent.**	
			Teacher Activity	**Student Activity**
Teacher beliefs about mathematics and how this influences learning and teaching of mathematics in Junior High School.	Definitions and interpretations of the concepts: beliefs attitudes and values Implications of teacher attitude on pupils' learning ofmathematicsin the Junior High School	**10 mins** **20 mins** **60 mins**	Review the previous lesson by asking student teachers to present their reflective paper on the importance of mathematics to society; ***(PD Theme 1)*** Give an exposition based on the concepts, attitudes, beliefs, and values ***(PD Theme 3)*** Engage student teachers in a discussion on how teachers' attitudes influence Junior High School learner's learning of mathematical concepts; ***(PD Theme 1& 3)***	Participate in the discussion to review the previous lesson; Listen attentively to the tutor or lecturer's verbal exposition on the concepts; attitudes, beliefs, and values and ask questions for clarification or provide comment(s) to ensure participation and understanding;

	Making connections between teacher beliefs and practice and developing mathematical task	**40 mins** **30 mins** **20 mins**	Assign student teachers to use a table to illustrate the differences and similarities among the concepts:values, attitudes, and beliefs; ***(PD Theme 1)*** Use Power point presentation, interspersed with questioning, to discuss how learners' attitude and beliefs influence their own learning of Mathematical concepts; ***(PD Themes 1 & 3)*** Assign student teachers to write a reflective paper on "What does it mean to learn and teach Mathematics?"as a consolidation exercise to be presented in the next lesson. ***(PD Theme 1)***	Engage in a think-pair-share session to outline and discuss the effect of teachers' attitudes on the learning and teaching of mathematics at the Junior High School; Create a table that illustrates the similarities and differences among values, attitudes, and beliefs and how these impact learning in Junior High School; Discuss the importance of Mathematics to people in various trades and professions in our Ghanaian cultural settings; Pay attention to and also participate in the discussion of how young children's attitude, beliefs, and values affect their learning of Mathematical concepts. Read further about what it means to Reflect on how learners' attitude and beliefs influence their own learning of Mathematical concepts
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Student teachers are to begin recording important ideas and experiences in their SRJ by writing few lines about their past experiences of mathematics and compare that to their experience of the new B. Ed. mathematics curriculum (Assessment as learning) NTS 1a - Critically and collectively reflects to improve teaching and learning. This is to be included in their professional teaching portfolios (PTP). NTS 3j - Produces and uses a variety of teaching and learning resources including ICT, to be included in their portfolios. NTS 3e - Employs a variety of instructional strategies that encourages student participation and critical thinking.			
Instructional Resources	sters illustrating people using mathematics in the jobs; video clips downloaded from the internet; journal articles based on beliefs, attitudes, and values within the context of mathematics teaching and learning			
Required Text (core)	Garegae, K. G. (2001). Teachers' beliefs about mathematics, its teaching and learning and the communication of these beliefs to students: A case study in Botswana.Unpublished Doctoral dissertation. University of Manitoba, Canada			
Additional Reading List	Radford, L. Theories in Mathematics Education: A Brief Inquiry into their Conceptual Differences Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra: Unimax Publishers. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers.			
CPD Needs	• How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" word games to reinforce concept developed)			

	• Instructional strategies needed to consciously engage student teachers to participate effectively and to be ready to share their past experiences without fear of ridicule; • Understand the various characteristics and uniqueness of Junior High School learners as suggested by various perspectives • How to design tasks for assessment procedures for assessment of, as and for learning to satisfy Junior High School learning experiences • Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports.

Lesson 3

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

Title of Lesson	Beliefs underlying the current Junior High School official curriculum and inclusive classroom practice	**Lesson Duration**	**3 Hours**
Lesson description	This lesson focuses on beliefs underlying the current Junior High School official curriculum and inclusive classroom practice. Areas of concentration include the Nature of Junior High School mathematics curriculum and Implications of this for classroom practice with emphasis on inclusion and equity from a reflective perspective. Student teachers will be required to participate in interactive activities including independent study to develop an understanding of what the curriculum they will use to teach entails. Thus, the lesson provides an overview of philosophies of mathematics and mathematics education and explores the beliefs implicit in the official mathematics curriculum and current classroom practice. The lesson has the tendency to develop student teachers' awareness of equity and diversity issues.		
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts based on child growth, development, and maturation; Student teachers have been introduced to the nature and importance of mathematics		
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about curriculum		

Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☒	**Work-Based Leaning** ☐	**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:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities*** – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	The purpose of the lesson is to;provide an overview of philosophies of mathematics and mathematics education and explores the beliefs implicit in the official mathematics curriculum and current classroom practice

• **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 different beliefs underlying the current Junior High School official curriculum and inclusive classroom practice	• Outline, describe and analyse different philosophies implicit in their personal beliefs that coincide or otherwise with those embedded in the current Junior High	• Communicative skills of student teachers: can be enhanced through the examination, interrogation and presentation of the philosophies of the JHS mathematics.

	• Demonstrate an understanding of relevant professional values and attitudes in teaching Junior High School mathematics	School curriculum. • Explain the influence of a teacher's values and philosophies of mathematics in students' learning • Write a short personal philosophy of teaching and learning of mathematics in Junior High School • Reflect critically on their own learning experiences and use the skills gained to plan for continuous personal and professional development • Describe differing conceptions about mathematics based on student teachers' own beliefs, values, and attitudes.	• Characteristics and uniqueness of JHS learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning • Inclusion and Equity: by supporting student teachers to recognize institutional and personal sources of barriers to leaning and making conscious efforts to address them. • Personal development: Developing understanding of NTS through conscious effort and support from mentors, peers, and tutors. • Support student teachers the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination) •

Topic Title	**Sub-topic(s)**	**Stage/ Time**	**Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative groupwork or independent.**	
			Teacher Activity	**Student Activity**
Beliefs underlying the current Junior High School official curriculum and inclusive classroom practice	Nature of Junior High School mathematics curriculum Implications for classroom practice relating to the concepts of inclusion and equity from a reflective perspective	**10 mins** **20 mins** **60 mins**	Project the learning outcomes and indicators for student teachers to know what is expected of them. Review the previous lesson by asking student teachers to present their reflective papers on the importance of mathematics to society; ***(PD Theme 1)*** Give an exposition based on inclusion and equity ***(PD Theme 3)***	Read the learning outcomes and indicators to help monitor what they are going through. Participate in the discussion to review the previous lesson; Listen attentively to the tutor or lecturer's verbal exposition on the concepts attitudes, beliefs, and values and ask questions for clarification or provide comment(s) to ensure participation and understanding;

		50 mins	Engage student teachers in a discussion on how teachers' knowledge and understanding of inclusivity and equity can influence their interpretation of the beliefs underlying Junior High School mathematics curriculum ***(PD Theme 1& 3)***	Engage in a think-pair-share session to outline and discuss the effect of teachers' attitudes on the learning and teaching of mathematics at the Junior High School;
	Making connections between teacher beliefs and practice and developing mathematical task	**40 mins**	Assign student teachers to write a reflective paper on "What does it mean to learn and teach Mathematics as a consolidation exercise to be presented in the next lesson. ***(PD Theme 1)***	Read further about what it means to reflect on the historical development of the numeration system and the contributions of different civilizations and cultures have made until the emergence of the Hindu-Arabic base ten system
Lesson assessments – evaluation of learning:of, for and as learning within the lesson	1. Reflect critically on their own learning experiences and use the skills gained to plan for continuous personal and professional development and to record this in their SRJ (Assessment for learning) NTS 1a- Critically and collectively reflects to improve teaching and learning. 2. Write a one paragraph personal philosophy of teaching with respect to mathematics, to be included in their SRJ (Assessment for learning) NTS 3a - Plans and delivers varied and challenging lessons, showing a clear grasp of the intended outcomes of their teaching.			
Instructional Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;			
Required Text (core)	Garegae, K. G. (2001). Teachers' beliefs about mathematics, its teaching and learning and the communication of these beliefs to students: A case study in Botswana.Unpublished Doctoral dissertation. University of Manitoba, Canada.			
Additional Reading List	Radford, L. Theories in Mathematics Education: A Brief Inquiry into their Conceptual Differences Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra: Unimax Publishers. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers.			
CPD Needs	• How to design and/or use some innovative materials and ideas for teaching selected concepts based on theories of learning in Junior High School mathematics. • Understand the various characteristics and uniqueness of Junior High School learners and how to use this in planning to teach. • How to design tasks for assessment procedures for assessment of, as and for learning. • How to monitor the progress of student teachers' portfolios, journals and STS reports.			

Lesson 4

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

Title of Lesson	Beliefs underlying the current Junior High School official curriculum and inclusive classroom practice 2				**Lesson Duration**		**3 Hours**
Lesson description	This lesson focuses on developing an understanding of what we know about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores trainee teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers children's developmental levels, how children learn mathematics and associated theories, and other psychological factors influencing learning. The lesson has the tendency to develop student teachers' awareness of equity and diversity issues.						
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts based on child growth, development, and maturation; Student teachers have been introduced to the nature and importance of mathematics						
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.						
Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☒	**Work-Based Leaning** ☐	**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:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities*** – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.						
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	The purpose of the lesson is to; develop student teachers' understanding of underlying beliefs, attitudes, and values within the context of teaching and learning mathematics and their implications for classroom practice relative to understanding learning difficulties in mathematics e.g. dyscalculia						
• **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 secure knowledge and understanding of relevant professional values and attitudes Demonstrate an	**Teaching** • Critically reflect on their own learning experiences and teaching and use them to plan for continuous personal development • Outline the need for developing values as well	• By promoting the skills ofTransitioning from early grade to upper primary class throughmodelling of subject-teacher; and establishment of personal bias and stigma. • Inclusion and Equity: by supporting student teachers to recognize				

	understanding of relevant professional values and attitudes in teaching Junior High School mathematics	as to promote respect for equity and inclusivity in the mathematics classroom • Analyse different perspectives on the need for developing professional values and attitudes	institutional and personal sources of barriers to leaning and making conscious efforts to address them. • Support student teachers the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination)

Topic Title	Sub-topic(s)	Stage/ Time	Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative groupwork or independent.	
			Teacher Activity	**Student Activity**
Beliefs underlying the current Junior High School official curriculum and inclusive classroom practice 2	Underlying assumptions of beliefs, attitudes, and values within the context of teaching and learning mathematics Implications for classroom practice relative to understanding learning difficulties in mathematics e.g. dyscalculia Making connections between teacher beliefs and practice and developing mathematical task	10 mins 20 mins 60 mins 40 mins 30 mins 20 mins	Project the learning outcomes and indicators for student teachers to know what is expected of them. Review the previous lesson by asking student teachers to present their reflective paper on the importance of mathematics to society; ***(PD Theme 1)*** Give an exposition based on the concepts, attitudes, beliefs, and values with respect to how they influence the implementation of any curriculum ***(PD Theme 3)*** Engage student teachers in a discussion on how teachers' attitudes influence Junior High School learner's learning of mathematical concepts; ***(PD Theme 1& 3)*** Assign student teachers to use a table to illustrate the differences and similarities among the concepts, values, attitudes, and beliefs; ***(PD Theme 1)*** Use Power point presentation, interspersed with questioning, to discuss how learners' attitude and beliefs influence their own learning of Mathematical concepts; ***(PD Themes 1 & 3)***	Read the learning outcomes and indicators to help monitor what they are going through. Participate in the discussion to review the previous lesson; Pay attention to the verbal exposition on the concepts, attitudes, beliefs, and values and how they influence the implementation of a curriculum Reflect on the implications of the discussions held above on their classroom observation Engage in a think-pair-share session to outline and discuss the effect of teachers' attitudes on the learning and teaching of mathematics at the Junior High School; Create a table that illustrates the similarities and differences among values, attitudes, and beliefs and how these impact learning in Junior High School; the importance of Mathematics to people in various trades and professions in our Ghanaian cultural settings; Pay attention to and also participate in the discussion of how young children's attitude, beliefs, and values affect their learning of Mathematical concepts. Read further about what it means to Reflect on the historical development of the numeration system and the

				contributions of different civilizations and cultures have made until the emergence of the Hindu-Arabic base ten system
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	1. Student teachers to reflective and discuss underlying assumptions of beliefs, attitudes (such as commitment, flexibility in ideas, tolerance, respect for evidence, reflection, etc), and values (such as respect, diversity, equity, team work, truth and integrity) within the context of teaching and learning of the basic school mathematics curriculum. 2. <u>Project work for the semester</u> Assign student teachers, in their small groups to: o Design and produce developmentally and age-appropriate TLMs from locally available materials that can be used to teach common fractions, decimal number and percent and to establish connections among them(NTS 3j, pg. 14) o Write an accompanying guide for each of the TLM explaining how to use them and which aspects of teaching JHS mathematics they are designed to address. o Identify the learning outcomes that likely to be achieved N/B: consider early grade learners' cultural, linguistic, socio-economic and educational backgrounds in designing the TLMs as well as theoretical perspectives that influence the choice of material and they were produced. Deadline for submission: 11th week of the semester			
Instructional Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;			
Required Text (core)	Garegae, K. G. (2001). Teachers' beliefs about mathematics, its teaching and learning and the communication of these beliefs to students: A case study in Botswana.Unpublished Doctoral dissertation. University of Manitoba, Canada			
Additional Reading List	Ministry of Education. (2010). *Teaching syllabus for core mathematics* (Senior High School). Accra: Ministry of Education, Science and Sports. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra: Unimax Publishers. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers.			
CPD Needs	• How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed) • Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside			

Lesson 5

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

Title of Lesson	Major theories of learning in Junior High School mathematics in inclusive classrooms				**Lesson Duration**	**3 Hours**	
Lesson description	This lesson focuses on developing an understanding of major theories of how Junior High Schoolchildren develop and learn mathematics. It provides an overview of theories of learning mathematics inJunior High School. Emphasises will be placed on major theories of learning and teaching of Junior High School mathematics in inclusive classrooms. Specifically, socio-cultural, activity theory and situated cognition perspectives will be discussed to enable student teachers develop appropriate knowledge and competencies for handling children in Junior High School classrooms.						
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with conceptsbased child growth, development, and maturation; Student teachers have been introduced to the nature and importance of mathematics						
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.						
Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☐	**Work-Based Leaning** ☐	**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:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities*** – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.						
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	**The purpose of the lesson is to;** • develop student teachers' understanding of socio-cultural, activity theory and situated cognition perspectives and their implications for practice						
• **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 knowledge and understanding of the theoretical basis of learning mathematics in Junior High School		**Inclusion and Equity** • Generate examples of children's individual differences based on their membership in various subcultures;		• Inclusion and Equity: by supporting student teachers to recognize institutional and personal sources of barriers to leaning and making conscious efforts to address them.		

	• Demonstrate knowledge and understanding of and appreciation for the contributions made by some theorists whose works are relevant to Junior High School professionals	• Suggest age-appropriate strategies for learning and teaching mathematics to Junior High School children • Outline similarities and differences among socio-cultural, activity, and situated cognition theories and to indicate their relevance in learning and teaching mathematics in Junior High School classrooms • Write short notes on contributions made by learning theorists such as the Johann Heinrich Pestalozzi, Friedrich Froebel, Maria Montessori, Jean Piaget, and Jerome Bruner, etc. Compare conceptions about the learning of mathematics implicit in the works of the theorists mentioned above and indicate how knowledge and understanding of their theories can support the teaching of mathematics in the Junior High School • Reflect critically on their own learning experiences are influenced by the theorists listed above.	• Communicative skills of student teachers: can be enhanced through the examination, interrogation and presentation. • Socio-cultural activity: Consciously support student teachers to outline socio-cultural, activity in teaching JHS mathematics. • Characteristics and uniqueness of JHS learners: By encouraging student teachers to develop awareness of the different learning theories of child growth, development and maturation support young children's learning • Professional development: Developing understanding of NTS through conscious effort and support from mentors, peers, and tutors.

Topic Title	**Sub-topic(s)**	**Stage/ Time**	**Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative groupwork or independent.**	
			Teacher Activity	**Student Activity**
Major theories of learning and teaching of Junior High School mathematics in inclusive classrooms	• Socio-cultural perspectives • Activity theory perspectives • A situated cognition perspective	10 mins 20 mins 50 mins	Review the previous lesson through questioning technique and to connect key issues that are emerging to the new lesson ***(PD Theme 1)*** Project the learning outcomes and indicators for student teachers to know what is expected of them. ***(PD Theme 1)*** Give a short exposition based on socio-cultural, activity theory and a situated	Participate in the discussion to review the previously learned material lesson Read the learning outcomes and indicators to help monitor what they are going through. Listen attentively to the tutor or lecturer's verbal exposition on the different theoretical perspectives under review.

	Making connections between the theoretical perspectives and learning of mathematics in Junior High School	40 mins 30 mins 20 mins 10 mins	cognition perspectives ***(PD Theme 3)*** Engage student teachers in a discussion on the similarities and differences of the theoretical perspectives mentioned above. ***(PD Theme 3)*** • Write a two-page report to identify the major ideas of Jean Piaget, Richard Skemp, Zoltan Dienes, Jerome Bruner and Vygotsky and their implications for teaching and learning of mathematical teaching practices at the Junior High School children level ***(PD Theme 1& 3)*** Relate the various theories to how they explain the way Assign student teachers to read further on the topic treated to prepare for the next lesson ***(PD Themes 1 & 3)***	Engage in a think-pair-share session to outline and hold a discussion on how similar or different the three theoretical perspectives mentioned are; Participate in the guided practice session to search for information about Johann Heinrich Pestalozzi, Friedrich Froebel, Maria Montessori, Jean Piaget, and Jerome Bruner using cooperative learning technique and demand corrective feedback. Take note of the assignment given; Read further about other relevant theoretical perspectives
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	1. As a student teacher how would you use the ideas of any of the following theorists: Friedrich Froebel, Maria Montessori, Jean Piaget, and Jerome Bruner in teaching a named concept in the JHS mathematics classroom? 2. Outline five (5) cultural practices and artefacts from your locality and explain how any one of them can be used in the teaching a named concept in the Early Grade mathematics syllabus. For example, using draught board for teaching fractions. NTS 2f - Takes accounts of and respects learners' cultural, linguistic, socio-economic and educational backgrounds in planning and teaching. Outline three (3) age-appropriate strategies for learning and teaching mathematics to early grade children and present. NTS 3g - Employs instructional strategies appropriate for mixed ability, multilingual and multi-age classes.			
Instructional Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;			
Required Text (core)	Kashefi, H. (2017). Teaching and learning theories applied in Mathematics classroom among Primary school teachers DOI: 10.1109/WEEF.2017.8467070			
Additional Reading List	Brunner, J. Jerome Bruner's Theory of Education: From Early Bruner to Later Bruner. Wilson, S. M., & Peterson, P. L. (2006). Theories of Learning and Teaching: What Do They Mean for Educators? Washington, DC 20036-3290 Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra: Unimax Publishers.			

	Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers.
CPD Needs	• How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed) • Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside

Lesson 6

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

Title of Lesson	Major theories of learning and teaching of Junior High School mathematics in inclusive classrooms 2				**Lesson Duration**		**3 Hours**
Lesson description	This lesson focuses on developing an understanding of what we know about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores trainee teachers' beliefs about mathematics and philosophies of mathematics implicit the official mathematics curriculum and current classroom practice. It also covers children's developmental levels, how children learn mathematics and associated theories, and other psychological factors influencing learning.						
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts based child growth, development, and maturation; Student teachers have been introduced to the nature and importance of mathematics						
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.						
Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☒	**Work-Based Leaning** ☐	**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:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities*** – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.						
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	**The purpose of the lesson is to;** • develop student teachers' understanding of theories of learning e.g., cognitive, constructivist and behaviourist perspectives and their implications for practice						
• **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 knowledge and understanding of Constructivism Behaviourism, Cognitivism theoretical perspectives of learning		• Outline the different facets of Constructivism, Behaviourism, Cognitivism and discuss their views on learning • Compare and contrast the constructivism, Behaviourism, Cognitivism as learning theories		• Inclusion and Equity: by supporting student teachers to recognize institutional and personal sources of barriers to leaning and making conscious efforts to address them. • Support student teachers the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias,		

	• Demonstrate knowledge and understanding of the implication of Constructivism Behaviourism and Cognitivism theoretical perspectives of learning Junior High School mathematics	• Reflect critically on the implications of the above-mentioned theoretical perspectives on the learning of mathematics at the Junior High School level	stereotypes and institutional discrimination) • Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning.

Topic Title	Sub-topic(s)	Stage/ Time	Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative groupwork or independent.	
			Teacher Activity	**Student Activity**
Major theories of learning and teaching of Junior High School mathematics in inclusive classrooms 2	• A cognitive perspective • Constructivism • Behaviourism • Implications for practice	**10 mins** **20 mins** **60 mins** **60 mins** **30 mins**	Review the previous lesson through questioning technique ***(PD Theme 1)*** Project learning outcomes and indicators on a screen for student teachers to read and be aware of what is ahead. Give an exposition based on cognitive, behaviourism constructivism and their implications on the learning of mathematics in Junior High School ***(PD Theme 3)*** Engage student teachers in a discussion cognitivist, constructivist, behaviourism and other theoretical perspectives and how they explain the way Junior High School children learn mathematical concepts; ***(PD Theme 1 & 3)*** Assign student teachers to read on the theorists such as Lev Vygotsky, Skemp etc. and their contributions to the learning of mathematics in the Junior High School ***(PD Theme 1)***	Participate in the discussion to review the previous lesson; Read the learning outcomes and indicators to develop awareness of the expectations in the lessons Pay attention to the verbal exposition on the on cognitive, constructivism and their implications on the learning of mathematics in Junior High School; Engage in a think-pair-share session to outline and discuss the effect of cognitivist, constructivist and other theoretical perspectives on the learning and teaching of mathematics in the Junior High School; Search on the internet for information about Lev Vygotsky, Skemp and other relevant theorists whose works explain how Junior High School children develop and learn mathematical concepts Read further about the importance of learning theories in the learning and teaching of mathematics in the Junior High School. (to be presented in the next class)
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	1. Assign student teachers in groups to compile a report on constructivism, Behaviourism, Cognitivism perspectives of learning to be presented in class, to be added to their professional teaching portfolios (PTP) (Assessment for learning) NTS 3a - Plans and delivers varied and challenging lessons, showing a clear grasp of the intended outcomes of their teaching.			
Instructional	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;			

Resources	
Required Text (core)	Sriraman, B., & English, L. (2005). Theories of mathematics education: A global survey of theoretical frameworks/trends in mathematics education research. ZentralblattfürDidaktik der Mathematik (International Reviews on Mathematical Education), 37(6), 450–456.
Additional Reading List	Radford, L. Theories in Mathematics Education: A Brief Inquiry into their Conceptual Differences Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra: Unimax Publishers. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers.
CPD Needs	• How to design worksheets as tools for assessment. • How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed) • Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside

Lesson 7

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

Title of Lesson	Children and Mathematics					**Lesson Duration**	**3 Hours**
Lesson description	This lesson focuses on developing knowledge and understanding of what we know about how children in Junior High School think about mathematics and how their understanding of mathematics develops. It provides an overview of psychological principles that explain what mathematics children are capable of learning and how they think as they go through given activities. It also highlights children's developmental levels, how children learn mathematics and associated theories, and other psychological factors influencing learning. The lesson has the tendency to deepen student teachers' awareness of equity and diversity issues.						
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts based on child growth, development, and maturation; Student teachers have been introduced to some major theories in the learning of mathematics in the Junior High School						
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.						
Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☐	**Work-Based Leaning** ☐	**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:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities*** – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.						
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	**The purpose of the lesson is to;** • develop student teachers' understanding of how children learn mathematics at the Junior High School level						
• **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 knowledge and understanding of different ways Junior High School children learn mathematical concepts as proposed by theorists and their relevance	• Describe how respect for gender, equity and inclusivity in the mathematics classroom promote learning for all • Identify theories and theoretical principles that are relevant to the learning and teaching of mathematics in the Junior High School classroom.	• Inclusion and Equity: by supporting student teachers to recognize institutional and personal sources of barriers to leaning and making conscious efforts to address them. • Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding				

	• Demonstrate an understanding of relevant theories and principles of learning and their implications for teaching Junior High School mathematics	• Analyse portions of the Junior High School official mathematics curriculum to identify which theoretical perspectives form the bases of the curriculum. • Observe and write a report on how Junior High School children (each student teacher will observe a couple of children) learn given mathematics concepts and to outline the implications of this for effective classroom instruction of mathematics for young children. • Reflect critically on their own learning experiences and use this as a basis for analysing relevant theories and principles of learning and their implications for teaching Junior High School mathematics	of child growth, development and maturation support young children's learning • Support student teachers the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination) • Critical thinking:bydeveloping student teachers' ability to think critically when analysing concepts.

Topic Title	**Sub-topic(s)**	**Stage/ Time**	**Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative groupwork or independent.**	
			Teacher Activity	**Student Activity**
Children and Mathematics	Children's Number readiness experiences Concepts for Number Readiness • *Understanding size, shape and patterns* • *Ability to count verbally (first forward, then backward)* • *Recognizing numerals* • *Identifying more and less of a quantity* • *Understanding one-to-one correspondence (for example, matching sets or knowing which group has four and which has five)* Logical and psychological approaches to learning mathematics	**10 mins** **30 mins** **60 mins**	Review the previous lesson on major theories of learning mathematics in Junior High School ***(PD Theme 1)*** Engage student teachers to outline theorists whose work are relevant to the development of young children and how they learn mathematics Give an exposition on theories that explain how children develop number readiness such *Understanding size, shape and patterns; Ability to count verbally; Recognizing numerals; Understanding one-to-one correspondence* ***(PD Theme 3)***	Participate in the discussion to review the previously learned material; List from memory theoretical perspectives and principles of learning that are relevant to Junior High School children Listen attentively to the tutor or lecturer's verbal exposition on the concepts attitudes, beliefs, and values and ask questions for clarification or provide comment(s) to ensure participation and understanding; Engage in a think-pair-share session to outline and discuss on logical and psychological approaches to learning mathematics.

		40 mins **40 mins**	Engage student teachers in a discussion based on logical and psychological approaches to learning mathematics. ***(PD Theme 1& 3)*** Assign student teachers to discuss different theoretical principles that explain Junior High School children's learning of mathematics. ***(PD Theme 1)*** Analyse portions of the Junior High School official mathematics curriculum to identify which theoretical perspectives form the bases of the curriculum. ***(PD Theme 1)***	Discuss theoretical principles that explain how children learn given mathematics concepts in Junior High School Read further about how early children learn mathematics
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	1. Student teachers are to write a reflective paper on logical and psychological approaches to learning mathematics at the Junior High School level (Assessment for learning) NTS 2e - Understands how children develop and learn in diverse contexts and applies this in his or her teaching. 2. Reflect critically on their own learning experiences and use this as a basis for analysing relevant theories and principles of learning and their implications for teaching Junior High School mathematics. (Assessment for learning) NTS 3e - Employs a variety of instructional strategies that encourages student participation and critical thinking. To be included in their PTP			
Instructional Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;			
Required Text (core)	Kashefi, H. (2017). Teaching and learning theories applied in Mathematics classroom among Primary school teachers DOI: 10.1109/WEEF.2017.8467070			
Additional Reading List	Anghileri, J. (2006). Scaffolding practices that enhance mathematics learning. Journal of Mathematics Teacher Education, 9,33–52. doi:10.1007/s10857-006-9005-9 . Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra: Unimax Publishers. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers.			
CPD Needs	• How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed) • Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside			

Lesson 8

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

Title of Lesson	Characteristics of children's developmental stages				**Lesson Duration**	**3 Hours**	
Lesson description	This lesson focuses on developing an understanding of characteristics of children's developmental stages. It provides an overview of some theories on how children develop. Emphasis will be placed on children's developmental levels, how children learn mathematics, and other psychological factors influencing learning. The lesson has the tendency to deepen student teachers' awareness of equity and diversity issues.						
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts based child growth, development, and maturation; Student teachers have been introduced to the nature and importance of mathematics						
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.						
Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☒	**Work-Based Leaning** ☐	**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:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities*** – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.						
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	**The purpose of the lesson is to;** develop student teachers' understanding of characteristics of children's developmental stagesand its implication for teaching at the Junior High School level						

• **earning 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 characteristics of children's developmental stages • Demonstrate knowledge and understanding of children's physical, language, speech, social, emotional, and cognitive and	• Describe differing theoretical views about children's developmental stages and their implications for classroom teaching and learning of mathematics; • Analyse theoretical perspectives which are relevant to how children develop and learn mathematics in	• Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning • Problem-solving techniques by consciously engaging student teachers in teaching and learning of mathematics that Compare and contrast the constructivism,

	intellectual development	Junior High School • Reflect critically on their own learning experiences and suggest theoretical perspectives that ex plain these modes of development. • Outline theories that explain physical, language, speech, social, emotional, and cognitive and intellectual development • Discuss how Junior High School children physical, language, speech, social, emotional, and cognitive and intellectual development affect their learning of mathematics	Behaviourism, Cognitivism as learning theories. • Support student teachers the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination) • Communicative skillsof student teachers:can be enhanced through the examination, interrogation and presentation. • Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning

Topic Title	**Sub-topic(s)**	**Stage/ Time**	**Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative groupwork or independent.**	
			Teacher Activity	**Student Activity**
Characteristics of children's developmental stages	Meaning and types of development e.g. Physical, language and speech, social and emotional, and cognitive development within the context of Junior High School teaching and learning of numeracy	**20 mins** **60 mins** **60 mins** **40 mins**	Review the previous lesson through questioning based on how early children learn mathematics ***(PD d on Theme 1)*** Give a verbal exposition on the meaning and types of development with emphasis on physical, language and speech, social and emotional, and cognitive development within the context of Junior High School ***(PD Theme 3)*** Assign student teachers (in small groups) to search for information on the internet about the contributions of any one of the following: • Johann Heinrich Pestalozzi, • Friedrich Froebel, • Maria Montessori, • Jean Piaget, and	Participate in the discussion to review the previous lesson; Pay attention to the verbal exposition on theories of learning mathematics in Junior High School and ask questions for clarification to ensure effective understanding; Discuss how Engage in a small group session to outline and discuss the contributions offered by given theorists to the learning of mathematics in Junior High School (each group will look for information on one theorist); Present information obtained briefly in class and to intensify the search

			• Jerome Bruner's in to understanding learning of mathematics in Junior High School ***(PD Theme 3)***	outside class hours to write a paper on children's number readiness
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	1. Outline theories that explain physical, language, speech, social, emotional, and cognitive and intellectual development. (Assessment as learning) NTS 2f - Takes accounts of and respects learners' cultural, linguistic, socio-economic and educational backgrounds in planning and teaching. 2. Discuss how Junior High School children physical, language, speech, social, emotional, and cognitive and intellectual development affect their learning of mathematics. (Assessment of learning) NTS 3g - Employs instructional strategies appropriate for mixed ability, multilingual and multi-age classes. Class discussions			
Instructional Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;			
Required Text (core)	Walshaw, M. (2017). Understanding mathematical development through Vygotsky, Research in Mathematics Education, 19:3, 293-309, DOI:10.1080/14794802.2017.1379728			
Additional Reading List	Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra: Unimax Publishers. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers.			
CPD Needs	• How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed) • Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside			

Lesson 9

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

Title of Lesson	Multiple intelligences				**Lesson Duration**		**3 Hours**
Lesson description	This lesson focuses on developing an understanding of the foundations of multiple intelligence theory and the influence of this on personal development. The lesson will focus on the foundations of multiple intelligence theory, multiple intelligences theory and implications for teaching numeracy in the Junior High School. It provides an overview of principles of multiple intelligences, description of the dimensions of Howard Gardner's multiple intelligences and how it relates to learning styles						
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts-based child growth, development, and maturation; Student teachers have been introduced to the characteristics of children's developmental stages						
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.						
Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☒	**Work-Based Leaning** ☐	**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:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities*** – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.						
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	**The purpose of the lesson is to;** • Audit knowledge and experiences of student teachers to establish and address their learning needs, perceptions and misconceptions in multiple intelligences. • Prepare them for teaching at the Junior High School level to be competent and confidence in handling diverse learners						
• **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 meaning and principles of multiple intelligences		• Outline and analyse principles of multiple intelligences, dimensions of Howard Gardner's multiple intelligences, learning styles • Reflect critically on their own learning experiences and how these relate to multiple intelligences		• Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning		

	Demonstrate knowledge and understanding of implications of multiple intelligences in classroom practice	• Outline how the dimensions of Howard Gardner's multiple intelligences can be used in teaching Junior High School children	• Critical thinking: by developing critical thinking among student teachers when dealing with JHS learners. • Support student teachers to discuss the major theories of learning and teaching of Upper primary mathematics in inclusive classrooms.	
Topic Title	**Sub-topic(s)**	**Stage/ Time**	**Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative groupwork or independent.**	
			Teacher Activity	**Student Activity**
Multiple intelligences	The foundations of multiple intelligence theory Multiple intelligences theory and personal development Implications for teaching numeracy in the Junior High School	**10 mins** **50 mins** **50 mins** **40 mins** **30mins**	Review the previously learned material; ***(PD Theme 1)*** State the learning outcomes for the lesson ***(PD Theme 1)*** Use a short exposition to present a highlight of Gardner's principles of multiple intelligences ***(PD Theme 3)*** Assign student teachers to do internet search on the theme "foundations of multiple intelligences" and to write short notes for group discussion ***(PD Theme 1 & 3)*** Engages student teachers in a discussion based on multiple intelligences theory and personal development ***(PD Theme 1)*** Use Power point presentation, interspersed with questioning, to discuss the implications of the multiple intelligence in the teaching and learning ***(PD Themes 1 & 3)***	Participate in the discussion to review the previous lesson; React to the statement of the learning outcomes through giving comments or questioning. Listen attentively to the tutor or lecturer's verbal exposition on the foundations of multiple intelligences and ask questions for clarification or provide comment(s) to ensure participation and understanding; Search on the theme "foundations of multiple intelligences and prepare short notes and to present the findings in groups Participate actively in the discussion of multiple intelligences theory and to identify the need to understand its implications in the Junior High School mathematics classroom Engage in a think-pair-share session to outline and discuss the implications of the multiple intelligence in the teaching and learning

Lesson assessments – evaluation of learning: of, for and as learning within the lesson	1. Outline and analyse principles of multiple intelligences and its effects on classroom learning. (Assessment as learning) NTS 3e - Employs a variety of instructional strategies that encourages student participation and critical thinking. 2. Compare multiple intelligences with learning styles and use this knowledge to plan a lesson in Junior High School mathematics class. (Assessment for learning) NTS 3e - Employs a variety of instructional strategies that encourages student participation and critical thinking. 3. Outline how the dimensions of Howard Gardner's multiple intelligences can be used in teaching named topics in the Junior High School mathematics curriculum and to be presented the following week. (Assessment of learning) NTS 3e - Employs a variety of instructional strategies that encourages student participation and critical thinking.
Instructional Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;
Required Text (core)	https://www.pdfdrive.com/multiple-intelligences-in-the-classroom-e888894.html
Additional Reading List	Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra: Unimax Publishers. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers. https://www.pdfdrive.com/multiple-intelligences-mi-the-theory-its-implications-d4106293.html https://www.pdfdrive.com/intelligence-reframed-multiple-intelligences-for-the-21st-century-d158133116.html
CPD Needs	• How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed) • Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside

Lesson 10

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

Title of Lesson	Factors that affect teaching and learning of numeracy in Junior High School						Lesson Duration	3 Hours
Lesson description	This lesson focuses on developing an understanding of factors that affect children's learning of mathematics. It provides an overview of principles of teaching and learning Junior High School Numeracy as found in the current. This lesson will expose student teachers to knowledge and understanding of what young children's developmentally appropriate strategies for learning mathematics. Knowledge of the developmental levels, how children learn mathematics and associated theories, and other psychological factors influencing learning, form part of this lesson. Student teachers will also develop awareness of equity and diversity issues.							
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts-based child growth, development, and maturation; Student teachers have been introduced to the principles of multiple intelligences							
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.							
Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☐	**Work-Based Leaning** ☐	**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:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities*** – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.							
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	**The purpose of the lesson is to;** • Create awareness of the various factors that affect Junior High School children's learning of mathematics and how these can inform their teaching practices							
• **Learning Outcome for the lesson, picked and developed from the course specification** • **Learning indicators for**	**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?**		

each learning outcome	• Demonstrate understanding of factors that affect Junior High School children' learning and teaching of Junior High School numeracy	• Outline and analyse different broad composition of factors; (teacher-based, home-based, school-based, natural and student based-factors) that affect Junior High School children' learning and teaching of Junior High School numeracy • Describe conceptions about teacher-student ratio as pre-requisites of teaching and learning of Junior High School Numeracy • Discuss the conceptions about the principles of teaching and learning in Junior High School Numeracy based on teacher-student factors	• Support student teachers to discuss the major theories of learning and teaching of Upper primary mathematics in inclusive classrooms. • Communicative skills of student teachers: can be enhanced through the examination, interrogation and presentation. • Problem-solving techniques by consciously engaging student teachers in teaching and learning of mathematics that Compare and contrast the constructivism, Behaviourism, Cognitivism as learning theories.
	Demonstrate knowledge and understanding of the Principles of teaching and learning in Junior High School Numeracy based on teacher-student factors	• Outline (some) principles of teaching and learning mathematics in the current Junior High School mathematics curriculum and analyse their effectiveness	• Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning

Topic Title	**Sub-topic(s)**	**Stage/ Time**	**Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative groupwork or independent.**	
			Teacher Activity	**Student Activity**
Factors that affect teaching and learning of numeracy in Junior High School	Principles of teaching and learning in Junior High School Numeracy	**10 mins** **50 mins**	Review the previous lesson by asking student teachers to present their work on the implications of multiple intelligences on teaching and students' learning. ***(PD Theme 1)*** Give an exposition on the factors that affect teaching and learning of numeracy in Junior High School to highlight some principles of teaching and learning of Junior High School numeracy ***(PD Theme 3)***	Participate in the discussion to review the previous lesson; Pay attention to the tutor or lecturer's verbal exposition on the principles of teaching and learning and ask questions for clarification to ensure understanding;

	Teachers' knowledge of the major factors (that affect Junior High School children's learning of mathematics) Teachers' knowledge of learner-teacher ratio factor	**50 mins** **30 mins** **30 mins** **10 mins**	Engage student teachers in a discussion on how teachers' knowledge of major factors affecting children's learning can influence their classroom practice ***(PD Theme 1 & 3)*** Provide student teachers with selected pages of the Junior High School mathematics curriculum to outline some specific learner-teacher ratio factors learning and teaching of numeracy in Junior High School ***(PD Theme 1)*** Use Power point presentation, interspersed with questioning, to discuss how knowledge of factors can influence the choices teachers make in their instructional practices. ***(PD Themes 1 & 3)*** Assign student teachers to read further on why student teachers have to develop understanding of factors affecting Junior High School children teaching and learning and write a reflective paper to be presented in the next class meeting. ***(PD Theme 1)***	Participate in a think-pair-share session to outline and discuss the factors that affect children's learning of mathematics and implications of this on teachers' classroom practice Outline the principles of learning and teaching mathematics in Junior High School and to describe how they will use such knowledge and understanding to support their activities in their school visits. Participate in the discussion of how knowing the factors that affect children's learning of Mathematical concepts can influence teachers' teaching of mathematics. Write a brief report based on the interview conducted for presentation in class.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	1. Analyse the differences among the broad composition of factors; teacher-based, home-based, school-based,natural and student based that affect Junior High School children's learning and teaching of mathematics. (Assessment for learning) NTS 3h - Sets meaningful tasks that encourages learner collaboration and leads to purposeful learning. 2. Outline (some) principles of teaching and learning mathematics in the current Junior High School mathematics curriculum and analyse their effectiveness. (Assessment of learning) NTS 3k - Integrates a variety of assessment modes into teaching to support learning for peer review			
Instructional Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;			
Required Text (core)	Jim C. (2003). An Overview of Theories of Learning in Mathematics Education Research.			
Additional Reading List	Poynter, A., & Tall D. Relating theories to practice in the teaching of mathematics Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra:			

	Unimax Publishers. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers.
CPD Needs	• How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed) • Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside

Lesson 11

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

Title of Lesson	Factors *that* affect teaching and learning numeracy in Junior High School	**Lesson Duration**	**3 Hours**
Lesson description	This lesson focuses on developing knowledge and understanding of factors that affect children's learning of mathematics. Specific areas of interest include Socio-cultural factors, attitude, and anxiety and the Implications of these for classroom practice. Student teachers will be engaged using a variety of strategies to ensure effective participation of all. Special attention will be given developmentally appropriate strategies are relevant for Junior High School children's developmental levels. Discussions and use of instructional resources, as well as, assigned tasks will focus on how Junior High Schoolchildren learn mathematics and associated theories, and other psychological factors influencing learning. The lesson will also look at the need for developing awareness of equity and diversity issues as potential factors that can influence children's learning of mathematics.		
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts-based child growth, development, and maturation; Student teachers have been introduced to an aspect of factors that affect children's learning of mathematics;		
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.		

Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☐	**Work-Based Leaning** ☐	**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:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities*** – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	The purpose of the lesson is to; • develop in student teachers an awareness and understanding of how socio-cultural factors, attitudes, beliefs, and anxiety can influence their learning and teaching of mathematics;

• **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 knowledge and understanding of different factors that affect Junior High School children's learning of	• Outline and analyse different factors that influence Junior High School children's learning of mathematics	• Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning • Support student teachers the opportunities to explore diversity

	mathematics and implications of this for classroom practice • Demonstrate knowledge and understanding socio-cultural factors; attitude; anxiety that influence learning and teaching of Junior High School mathematics	• Describe their views about how teacher content knowledge, pedagogical knowledge, and pedagogical content knowledge that affect children's learning of mathematics in Junior High School. • Outline and analyse how socio-cultural factors; attitude and anxiety that influence learning and teaching of Junior High School mathematics; • Reflect critically on the impact of socio-cultural factors; attitude; anxiety on classroom practices	within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination) • Inclusion and Equity: by supporting student teachers to recognize institutional and personal sources of barriers to leaning and making conscious efforts to address them. • Digital literacy**:**can afford student teachers the opportunity todevelop records for reflective journals using digital tools.

Topic Title	**Sub-topic(s)**	**Stage/ Time**	**Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative groupwork or independent.**	
			Teacher Activity	**Student Activity**
Factors *that* affect teaching and learning numeracy in Junior High School	Socio-cultural factors; attitude; anxiety; Implications for classroom practice	**10 mins** **50 mins** **60 mins**	Review the previous lesson by asking student teachers to present an outcome of the short interview with about two children on school visit ***(PD Theme 1)*** Give an exposition based on socio-cultural factors, attitudes, beliefs, values and anxiety. ***(PD Theme 3)*** Engage student teachers in a discussion on how teacher content knowledge, pedagogical knowledge, and pedagogical content knowledge that affect children's learning of mathematics in Junior High School ***(PD Theme 1& 3)***	Present short reports and participate in the discussion to review the previous lesson; Listen attentively to the tutor or lecturer's verbal exposition on the concept's attitudes, beliefs, values and anxiety. and ask questions for clarification or provide comment(s) to ensure participation and understanding; Engage in a think-pair-share session to outline and discuss the effect of teachers' teacher content knowledge, pedagogical knowledge, and pedagogical content knowledge that affect children's learning of mathematics in Junior High School

		40 mins **20 mins**	Use Power point presentation, interspersed with questioning, to discuss how teachers' professional values and attitudes remain important factors in their teaching of Junior High School mathematics ***(PD Themes 1 & 3)*** Assign student teachers to write a reflective paper on the topic "The role of the teacher in promoting effective learning of mathematics in Junior High School"to be submitted the following week ***(PD Theme 1)***	Create a table that illustrates the similarities and differences among values, attitudes, and beliefs and how these impact learning in Junior High School; Pay attention to and also participate in the discussion of how teachers' professional values and attitudes remain important factors in their teaching of Junior High School mathematics Do internet search and further reading to write reflective papers individually on the topic "The role of the teacher in promoting effective learning of mathematics in Junior High School"
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	**Student teachers to submit the following;** 1. 1. a final portfolio in mathematics, with emphasis on Early Grade Curriculum and relative to theories of learning, **(Course work)**(Assessment as learning) NTS 3k - Integrates a variety of assessment modes into teaching to support learning. 1. Project work report on designing TLMs for teaching numeracy in early grade. **(Project)** (Assessment as learning) NTS 3h - Sets meaningful tasks that encourages learner collaboration and leads to purposeful learning.			
Instructional Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;			
Required Text (core)	Tsafe, A. K. (2012). Effective Learning of Mathematics: From Theory to Practice. Volume 13 (2)			
Additional Reading List	Joan, M. E. & Katharine R. S. (). Integrating Social, Moral, and Cognitive Developmental Theory: Implications of James Fowler's Epistemological Paradigm for Basic Writers Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra: Unimax Publishers. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers.			
CPD Needs	• How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed) • Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside			

Lesson 12

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

Title of Lesson	Factors that affect learning and teaching of numeracy in Junior High School	**Lesson Duration**	**3 Hours**
Lesson description	This lesson focuses on developing knowledge and understanding of factors that affect children's learning of mathematics. Specific areas of interest include Social and emotional intelligence and how these influence Junior High School children's learning of mathematics and its Implications for classroom practice. Student teachers will be engaged using a variety of strategies to ensure effective participation of all. The lesson will also look at the need for developing awareness of equity and diversity issues as potential factors that can influence children's learning of mathematics.		
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts based on child growth, development, and maturation; Student teachers have been introduced to socio-cultural factors; attitude and anxiety		
Possible barriers to learning in the lesson	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.		

Lesson Delivery – chosen to support students in achieving the outcomes	**Face-to-face** ☒	**Practical Activity** ☒	**Work-Based Leaning** ☐	**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:** opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode. **Practical Activity:** enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities. **Seminars:** to generate group and individual creativity, discussion and reflection: student and / or tutor led **Independent study:** to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes **E-learning *opportunities*** – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.
• **Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.**	**The purpose of the lesson is to;** • develop in student teachers an awareness and understanding of how social and emotional intelligence, among other factors, like attitudes, beliefs, and anxiety can influence their learning and teaching of mathematics;

• **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 social and emotional intelligence and how this influences Junior High School children's learning of mathematics	• Outline and analyse different roles that teachers play in developing children's emotional intelligence • Describe teachers' concerns for teaching emotional intelligence; • Discuss the basic ingredients of emotional and social intelligences (e.g. self-	• Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's • student teachers to recognize institutional and personal sources of barriers to leaning and making conscious efforts to address them.

	• Demonstrate knowledge and understanding of how to validate the feelings of others in a busy classroom.	awareness, self-control, empathy, personal motivation and relationships skills) • Develop a short personal strategies for identifying interpersonal and intrapersonal intelligences and to discuss how these influence classroom practice • Reflect critically on how Junior High School children feel about learning of mathematics • Outline and analyse how Social and emotional intelligence influences the promotion of equity and inclusivity in the mathematics classroom	• Personal development: Developing understanding of NTS through conscious effort and support from mentors, peers, and tutors. • Inclusion and Equity: by recognizing institutional and personal sources of barriers to leaning and making conscious efforts to address them. • Professional development: Developing understanding of NTS through conscious effort and support from mentors, peers, and tutors.

Topic Title	**Sub-topic(s)**	**Stage/ Time**	**Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative groupwork or independent.**	
			Teacher Activity	**Student Activity**
Factors that affect learning and teaching of numeracy in Junior High School	Social and emotional intelligence and children's learning of mathematics What social qualities are to be nurtured in children to promote effective learning of mathematics in Junior High	**20 mins** **30 mins** **30 mins** **40 mins** **40 mins**	Review the previous lesson through questioning; ***(PD Theme 1)*** Project learning outcomes and indicators for student teachers to read Provide verbal exposition on social and emotional intelligence Hold a discussion on the role of acceptance, tolerance, cooperation, striving for the common, and other values in promoting classroom learning and successful life for all. Leads a discussion on how teachers' knowledge of learners' social and emotional intelligence influence group formation and effective group activities Monitors student teachers as they search the internet for social qualities that children need to be effective partners in the learning of	Participate in the discussion to review the previous lesson; Read learning outcomes and indicators to become aware of what is expected of them. Pay attention to the verbal exposition based on social and emotional intelligence and children's learning of mathematics Participate in the discussion on the role of acceptance, tolerance, cooperation, striving for the common, and other values in promoting classroom learning and successful life for all. Participate in the discussion on how teachers' knowledge of learners' social and emotional intelligence influence group formation and effective group activities

	School classroom?	**20 mins**	mathematics. ***(PD Theme 1& 3)*** Assign student teachers to write a reflective paper on "The need for developing appropriate social qualities in Junior High School learners" for effective learning and a healthy life. ***(PD Theme 1)***	Search the internet for social qualities that children need to be effective partners in the learning of mathematics Discuss their findings briefly in small groups on the implications of these for teachers' classroom instructional practices. Read further about what it means to develop social qualities and to reflect through writing on the implications of this on their preparation to become effective teachers. Outline some social qualities they consider very important for children's emotional and social development and how this can influence children's learning of mathematics (through independent study and to present later for grading). Write a reflective paper on how teachers' knowledge of children's social and emotional intelligence can affect their classroom practices (to be submitted for grading)
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	**Student teachers to submit the following;** **involve in review of the course;** • a final portfolio in mathematics, with emphasis on Junior High School Curriculum and relative to theories of learning. • journal entries based on their experiences in how children learn mathematics in Junior High School. **(Assignment)** • report of STS observation and small group teaching in Junior High School mathematics classroom. (**collaborative project or presentation)** • provide information on end of semester examination based on learningtheories inJunior High School mathematics.			
Instructional Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;			
Required Text (core)	Tsafe, A. K. (2012). Effective Learning of Mathematics: From Theory to Practice. Volume 13 (2)			
Additional Reading List	Joan, M. E. & Katharine R. S. Integrating Social, Moral, and Cognitive Developmental Theory: Implications of James Fowler's Epistemological Paradigm for Basic Writers Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Tutor notes*. Accra: Unimax Publishers. Martin, J. et. al. (1994). *Mathematics for teacher training in Ghana: Students activities*. Accra: Unimax Publishers.			
CPD Needs	Review of previous lessons and preparation for end of the semester examination based on learning theories in early grade mathematics.			
[1]**Component 1: Subject Portfolio Assessment (30% overall)** • Selected items of students work(2 of them 10% each)-30%				

[1] See rubrics on Subject Portfolio Assessment in Annex 6 of NTEAP

- Midterm assessment -20%
- Reflective journal 40%
- Organization of the subject portfolio-10% (how it is presented /organized

[2]Component 2: Subject Project Assessment (30% overall score)

- Introduction; a clear statement of aim and purpose of the project-10%
- Methodology; what the student teacher has done and how achieve the purpose of the project-20%
- Substantive or main section-40%
- Conclusion – 30%

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

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