

# **FOSO COLLEGE OF EDUCATION**

## **MATHEMATICS AND ICT DEPARTMENT**

**2021/2022 ACADEMIC YEAR**

**COURSE MANUAL FOR LEVEL 100; FIRST SEMESTER**

COURSE CODE: EBS101

COURSE TITLE: ELEMENTARY

CREDITS: 3 HOURS

### **COURSE TUTORS' INFORMATION**

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## ELEMENTARY ALGEBRA

<b>Course Title</b>	Elementary Algebra						
<b>Course Code</b>	<b>EBS 101</b>	<b>Course Level:</b>	<b>100</b>	<b>Credit Value:</b>	<b>3 credits</b>	<b>Semester</b>	<b>1</b>
<b>Pre-requisite</b>	Students have knowledge of basic algebra in SHS core Mathematics						
<b>Course Delivery Modes</b>	<b>Face-to face <sup>1</sup></b>	<b>Practical Activity <sup>2</sup></b>	<b>Work-Based Learning <sup>3</sup></b>	<b>Seminars <sup>4</sup></b>	<b>Independent Study <sup>5</sup></b>	<b>e-learning opportunities <sup>6</sup></b>	<b>Practicum <sup>7</sup></b>
	✓	✓	✓		✓	✓	✓

<b>Course Description for significant learning (indicate NTS, NTECF, BSC GLE to be addressed)</b>	The course is designed to deepen students' understanding of Algebra. Students will be exposed to the following topics: Applications of Sets, Binary operations, Ratio, Proportions and Rates, Number bases and their applications, Indices and Logarithms, Functions, Algebraic expressions and Equations (Linear, Quadratic), Linear Inequalities. Emphasis will be made on the practical applications of these topics through the use of word problems and semester projects. The approaches that would be used in the delivery of this course should prepare trainees to ensure the learning progress of all students by projecting gender roles and issues relating to equity and inclusivity. (NTS 1a, 1b, 2c, NTECF Pillar 1, (p. 21), P. 39, P.45)			
<b>Course Learning Outcomes<sup>8</sup>: including</b>	<b>Outcomes</b>		<b>Indicators</b>	
<b>INDICATORS for each learning outcome</b>	By the end of the course, the student will be able to:			
	1. demonstrate a sound understanding of concepts and procedures covered in the algebra course (NTS 1a, 1b, 2c )	<ul style="list-style-type: none"> <li>• Show relational understanding of specific topics learnt in the course</li> <li>• Solve simple problems on the topics covered.</li> </ul>		
	2. apply the concepts learnt to solve real life problems (NTS1a, 1b, 2c)	<ul style="list-style-type: none"> <li>• Apply knowledge of specific topics learnt in the course</li> </ul>		
<b>Course Content</b>	<b>Units</b>	<b>Topics:</b>	<b>Sub-topics (if any):</b>	<b>Teaching and learning activities to achieve learning outcomes</b>

1	Binary operations	Properties of binary operations i.e. closure, commutative, associative and distributive. Finding identity elements and inverses	Engage students in activities to explore the closure, commutative, associative and distributive properties of binary operation on real numbers  Use cooperative learning groups to engage students to identify the identity elements and inverses for defined binary operations
2	Applications of Sets	Subsets, operations, complement of a set, and solutions of two- and three set problems.	Use real life situations in class for students to determine subsets of given sets, complements of sets, perform operations on sets and solve two- and three- set problems
3	Ratio, Proportions, Percentages and Rates	Concepts of ratio and proportion, percentages, rates and their applications.	Create contexts for ratio, proportion, rates and percentages to enable students gain an in-depth knowledge of the concepts and apply knowledge of these concepts in solving real life problems e.g.
			VAT, depreciation, interest, profit and loss, commission, etc
4	Number bases and their applications	Number bases up to 12; Application of number bases. Solving equations involving number bases e.g. $243_x = 201$	Involve students in activities which will enable them to count objects and write numbers in various number bases, perform basic operations.  Provide worthwhile tasks on simple equations involving number bases for students to solve

5	Indices and Logarithms	Laws of indices, negative indices, simple equations involving indices; definition of logarithms, laws of logarithms and simple equations involving logarithms.	Use cooperative learning groups to engage students explore and discover the laws of indices, and logarithms and to apply the laws in solving simple problems
6	Relations and Functions	Relations, mapping and functions; types, domain, co-domain, images, range; inverse of simple functions, algebra of functions, composition of two functions e.g. $g \circ f$ , $f \circ g$ , graphs of functions	<p>Create appropriate contexts for students to distinguish between the various types of relations and functions, find the domain, codomain and inverses of given functions.</p> <p>Provide contexts for composition of functions, perform addition, subtraction, multiplication and division of functions.</p> <p>Use ICT tools to guide students to explore the nature of given functions by graphing</p>

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	7	Algebraic expressions and Equations Linear, Quadratic,	Factorization of algebraic expressions up to four terms, solving simple linear equations, Graphs of linear and quadratic equations,  Solving simultaneous linear equations involving two variables by graphical, elimination and substitution approaches. Solving word problems involving simple linear equations.	Use algebra tiles to guide students to factorize algebraic expressions (linear and quadratic) and to expand products of two binomials up to the form $(ax + b)(x + a)$ .  Use ICT tools to guide students to explore the nature of graphs of linear and quadratic graphs and find solution of linear, quadratic and simultaneous linear equations involving two unknowns. Encourage students to compare solutions by different methods, e.g elimination, substitution and graphical approaches.  Expose students to various problems solving strategies to equip them to tackle word problems
	8	Linear Inequalities	Solving simple linear inequalities, Graphs of linear inequalities, solving word problems involving linear inequalities.	Create contexts for linear inequalities and guide students to solve simple real life problems on linear inequalities.  Expose students to the use of ICT tools to explore the nature of graphs of inequalities.
<b>Course Assessment Components<sup>9</sup> : (Educative</b>	<p><b>Component 1: Formative Assessment (Individual and Group presentations)</b></p> <p><b>Summary of Assessment Method:</b> Critical Thinking, problem solving skills, creative and innovative skills, life-long learning/ personal skills, collaborative/ social skills, communication skills, literacy and numeracy skills, leadership skills, digital literacy/ICT skills (NTECF p. 45)</p>			

<p><b>assessment of, for and as learning)</b></p>	<ul style="list-style-type: none"> <li>• Presentations</li> </ul> <p>Weighting (10%)</p> <p>Assesses Learning Outcomes: CLO 1 (Units 7 and 8)</p> <hr/> <p><b>Component 2: Formative Assessment</b></p> <p><b>Summary of Assessment Method:</b> Critical Thinking, problem solving skills, creative and innovative skills (NTECF p. 45)</p> <ul style="list-style-type: none"> <li>• Assignments</li> <li>• Class exercises</li> <li>• Quizzes</li> </ul> <p>Weighting (30%)</p> <p>Assesses Learning Outcomes: CLO 1 &amp; 2 (Units 1, 3, 5 and 6)</p> <hr/> <p><b>Component 3: Summative Assessment</b></p> <p><b>Summary of Assessment Method:</b> End of Semester Examinations Unit 1 – 8 (Core skills to be developed: Critical Thinking, problem solving skills, creative and innovative skills (NTECF p. 45))</p> <p>Weighting (60%)</p> <p>Assesses Learning Outcomes: CLO 1 &amp; 2</p>
<p><b>Instructional Resources</b></p>	<p>Algebra tiles, Geoboard/geodot, ICT tools including calculators and computers</p>
<p><b>Required Text (core)</b></p>	<p>Asare-Inkoom, A. (2012). <i>Further/elective Mathematics for Senior Secondary Schools (Vol.1)</i>. Cape Coast, Hampton Printing Press.</p>

	<p>Martin, J. L. (1994) <i>Mathematics for teacher training in Ghana- students' activities and tutor's notes</i>. Accra: Unimax Macmillan Ltd.</p>
<b>Additional Reading Lists</b>	<p>Backhouse, J. K., &amp; Houldsworth, S. P. T. (1985). <i>Pure mathematics 1</i>. England: Pearson.</p> <p>Barnett, R. A., Ziegler, M. R., &amp; Byleen, K. E. (2008). <i>College Algebra with Trigonometry</i>. New York, McGraw-Hill.</p> <p>Backhouse, J. K. &amp; Houldsworth, S.P.T (2005). <i>Pure Mathematics 1</i>. London, Longman.</p> <p>Larson, R. E., Kanold, D. T., &amp; Stiff, L. (1993). <i>Intermediate algebra</i>. Canada: D. C. Heath and Company.</p> <p>Ofosu, J. B. (2001). <i>A comprehensive SSS course in elective Mathematics</i>. Accra: Afram Publication.</p> <p>Swokowski, E. W. &amp; Cole, J. A. (2005). <i>Precalculus: Functions and Graphs (10<sup>th</sup> ed.)</i>.Canada, Thomson Brooks/Cole.</p> <p>Turner, L. K., &amp; Knighton, D. K. (1986). <i>Advanced algebra 1 (2<sup>nd</sup> ed.)</i>. England: Longman.</p>