



ADEYEMI COLLEGE OF EDUCATION ONDO, ONDO STATE

DEPARTMENT OF INTEGRATED SCIENCE NCE COURSE OUTLINE

List of Courses	Course Codes	Course Titles	Course Outline	Units	References
1.	ISC 111	Mathematics for Science I	<p>Use calculating aids such as tables and electronic calculators for the four arithmetic functions, plus reciprocals, square roots, sine, cosines, tangents, exponentials and logarithms.</p> <p>1.1 Take account of accuracy in numerical work so that significant figures are neither lost nor carried beyond what is justified.</p> <p>1.2 Make appropriate evaluations of numerical expressions (e.g. $n^2 = 10$; $\sin 30^\circ = 0.5$) and use such approximations to check the magnitudes of machine * calculations</p> <p>1.3 Use the following as examples:</p> <ul style="list-style-type: none"> • Exponential growth in Human population • Population data: the accuracy of census, sample survey and vital registration system. • Population quantities e.g. birth rate, population density. <p>(2) ALGEBRA</p> <p>2.1 Positive and negative indices and square roots.</p> <p>2.2 Simple algebraic equations, linear equations and quadratic equations, using correct formulae.</p>	1	<p>Adler, I., & Miller, R. (1990). <i>Mathematics</i>. New York: Doubleday.</p> <p>Williams, E. (1979). <i>Mathematics</i>. Woodbury, N.Y: Barron's Educational Series, Inc.</p>
2.	ISC 112	Science Education I	<p>The science methodology component of the course acts as a bridge between the more formal Education course taught by the Education Department and the science content which forms the bulk of the work done within the NCE Integrated</p>	1	<p>John, W. (2000). <i>Science education</i>.</p>

		<p>Science. The focus is on the question: how can we help children to learn science? This subsumes two further questions: “how do children learn science? What is special about science? The understanding of diseases caused by viruses and other microbes e.g. AIDS and the search for their cure is an example of the uses, to which ‘man puts scientific knowledge. These questions loosely correspond to cognitive and developmental psychology and to the sociology and history of science. These themes are presented as questions in order to emphasize their application to classroom practice and curriculum implementation. The first year of Science Education (course ISC 112 and 122) concentrates upon the psychological, philosophical and historical aspects of answering these questions.</p> <p>“HOW DO CHILDREN LEARN SCIENCE?”</p> <p>1.0 <u>A Brief Introduction</u></p> <p>1.1 History and philosophy of integrated Science;</p> <p>1.2 Traditional African Ideas;</p> <p>1.3 Behaviourism;</p> <p>1.4 Constructivism;</p> <p>2.0 CURRENT OR RECENT COMPETING THEORIES ON LEARNING</p> <p>Their implications for the Science Curriculum;</p> <p>2.1 Skinner’s behavioural ideas;</p> <p>2.2 The Bloom taxonomy of educational objectives;</p> <p>2.3 Gagne’s ideas;</p> <p>2.4 Piagetian Stage theory;</p> <p>2.5 Brunner’s ideas;</p> <p>2.6 Ausubel and the alternative conceptions movement;</p> <p>2.7 Application of education theories to science teaching.</p> <p>This will demonstrate to students that our best theories are only, provisional and arise out to several competing theories.</p>	<p>New York, NY.</p> <p>Association for Science Education. (1961). <i>Science and education: Ib</i>. London: Murray.</p>
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3.	ISC 113	Introduction to Scientific Methods	<p>Definition of science, ethics and science process skills as ways of finding but about the environment and attempt to put structure on it. Assumptions of Science concerning nature and the processes and products of scientific investigation.</p> <p>1.0 OBSERVATION</p> <p>1.1 Senses and related organs</p> <p>1.2 Use of senses to make and record observations</p> <p>1.3 Uses of Aids such as microscope, hand lens, telescope, glasses, hearing Aids.</p> <p>MEASUREMENT</p> <p>Standard S.I. units and common related units for measurement of length, area, volume mass, temperature and time.</p> <p>Apparatus and instruments for measurement in the units specified in 2.1</p> <p>CLASSIFICATION</p> <p>Grouping or classifying objects in the environment by colour, shape, behaviour and other observed criteria.</p>	1	Weatherall, M. (1969). <i>Scientific method</i> . New York: Simon and Schuster.

			<p>Classification of living things: plants and animals; vertebrates and invertebrates; groups of vertebrates, flowering and non-flowering plants.</p> <p>4.0 ETHICS OF SCIENCE AND SCIENTIFIC ATTITUDES Knowing the ethics of science and developing scientific attitudes know the assumptions of science concerning nature and the processes and products of scientific investigation/implication.</p> <p>SCIENCE PROCESS SKILLS Application of science process skills to emphasis on communicating, interpreting data, designing experiments, reporting completely, and accurately, formulating hypotheses, generalizing, predicting, etc</p>		
4.	ISC 114	Components of Environment I	<p>Air, water, weather and soil as components of the environment.</p> <p>1.0 AIR</p> <p>1.1 Air pollution, sources and consequences of air pollution</p> <p>1.2 One method for determining experimentally the proportion of oxygen in the atmosphere;</p> <p>1.3 Qualitative and Quantitative composition of air in terms of nitrogen, oxygen, and water vapour, inert gases and carbon dioxide;</p> <p>1.4 Physical properties and uses of oxygen and carbon dioxide and their importance of living things;</p> <p>2.0 WATER</p> <p>2.1 Sources of water;</p> <p>2.2 Importance of water to Life;</p> <p>2.3 Nature of water as a solvent;</p> <p>2.4 Importance of oxygen dissolved in water;</p>	2	<p>Balasubramanian, A. (2008). Ecosystem and its components.</p> <p>Raven, P. H., Hassenzahl, D. M., Hager, M. C., Gift, N. Y., & Berg, L. R. (2015). <i>Environment</i>.</p>

			<p>2.5 Sources of water and contaminating agents, (e.g: sewage, oil, Chemicals):</p> <p>2.6 Methods of water purification (e.g. use of chemicals, filtration, boiling, sedimentation);</p> <p>2.7 Compare rural and urban water supplies;</p> <p>2.8 Effects of water cycle, including the formation of ice, thunder, lightning, non-uniform rainfall on the environment, with respect to plant growth and erosion.</p> <p>3.0 WEATHER</p> <p>3.1 Elements of weather (temperature, humidity, wind, rain, etc.);</p> <p>3.2 Uses of simple weather recording instruments in a weather station (thermometer, rain guage, wind vane, barometer, hygrometer, etc.);</p> <p>3.3 Keep weather records in chart form.</p> <p>4.0 SOIL</p> <p>4.1 Organisms that live in soils in our environment;</p> <p>4.2 Mineral component of the soil: soil texture, inorganic and organic components, air content and water;</p> <p>4.3 Formation of soil in the light of climate and weathering, parent material, topography, organisms, influence of man and time;</p> <p>4.4 Types of soil; sandy, clay, loamy, humus, etc;</p> <p>4.5 Value of soil as a non-renewable resource and discuss the uses and importance of soil.</p> <p>4.6 Common causes and forms of soil erosion and the relevant preventive measures.</p> <p>4.7 Practices that influence of bush burning regulations agent.</p> <p>4.8 Drainage patterns, causes, prevention and effect</p>		
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5.	ISC 115	Nature of Matter I	<p>States of Matter explained in terms of particles; physical and chemical changes; separation; elements; compounds and mixtures.</p> <p>1.0 STATES OF MATTER</p> <p>1.1 Evidence for the existence of matter as particles;</p> <p>1.2 General physical properties of solids, liquids and gases;</p> <p>1.3 Boyle's law, Charles' law, Ideal gas law, $PV=nRT$ and the effect of intermolecular.</p> <p>1.4 Vapour pressures of a pure liquid depends on temperature (qualitative treatment only);</p> <p>1.5 Vapour pressure and relationship with external pressure: Structure of NaCl as an ionic solid and carbon (diamond) and carbon (graphite) as macromolecular-structures; plastics as polymers (cross-linked or not) and glasses as super cooled liquids.</p> <p>2.0 PHYSICAL AND CHEMICAL CHANGES; SEPARATION TECHNIQUES</p> <p>2.1 Differences between physical and chemical changes;</p> <p>2.2 Meanings of solution, solute, solvent, and apply them to Aqueous and some non-aqueous systems;</p> <p>2.3 Techniques and applications of distillation, evaporation, sedimentation, crystallization, filtration, and chromatography e.g. paper and alum.</p> <p>3.0 ELEMENTS, MIXTURES AND COMPOUNDS</p> <p>3.1 Classification of matter into elements, mixtures and compounds; and distinguish between them;</p> <p>3.2 Classification of common elements as metals and non-metals and as solids, liquids, or gases at room temperature.</p> <p>3.3 Uses of common elements, compounds and mixture</p>	1	Cooper, C. (2000). <i>Matter</i> . London: Dorling Kindersley.
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6.	ISC 211	Components of Environments II	<p>1.0 CHARACTERISTICS OF LIVING AND NON LIVING THINGS</p> <p>Characteristics and classification of living things, cells chromosomes and genes, bacteria and viruses, fungi.</p> <p>1.1 Classification of growth in terms of temporary and permanent changes</p> <p>1.2 Physical and chemical changes in non living things and their characteristics.</p> <p>1.0 PLANT AND ANIMAL CELL</p> <p>2.1 Cheek cells and onion cells for viewing under a microscope, and to observe permanent slides of different types of cells under microscope.</p> <p>2.2 Distinguish between animal and plant cells e.g cytoplasm, cell wall, cell membrane, nucleus, vacuoles and chloroplast in a plant cell, cytoplasm, cell membrane and nucleus in animal cell.</p> <p>CHROMOSOMES AND GENES</p> <p>Nuclei as it contain chromosomes and that chromosomes carry, genes: Genes as a carrier of chemical information which determines an individual Characteristics/traits.</p> <p>Sex preferences among Nigerian communities and consequences on population: Importance of family trait.</p> <p>BACTERIA AND VIRUSE</p> <p>Bacteria and viruses are micro-organisms Bacteria and viruses are important members of ecological cycles Importance of bacteria in natural Bacteria and viruses and their effects on food, nutrition and health.</p> <p>5.0 FUNGI</p> <p>5.1 Fungi and state their characteristics:</p> <p>5.2 types of fungi;</p> <p>5.3 Occurrence of fungi, their use as food and in industry;</p>	2	<p>Barbour, S. (2000). <i>The environment</i>. San Diego: Greenhaven Press.</p> <p>Beiser, A. (1984). <i>The earth</i>. Westport, Conn: H.S. Stuttman.</p>
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			5.4 Fungi and its effects on food, nutrition and health		
7.	ISC 212	Science Education II	<p>In the second year, student-teachers will be turning their attention towards the business of teaching science in schools to pupils. This is the time to draw together the work of the first year and to think about how the fundamental question of: "How can we help children learn science?". Can be translated, into classroom practice. The Science Education Courses ISC 212 and ISC 222 address the problem of effective.</p> <p>Management of the Learning Environment The following topic form the basis of discussion (about 10 hours for each);</p> <p>1.0 THE TEACHER AS A MANAGER OF THE LEARNING ENVIRONEMENT</p> <p>1.1 Time and lesson planning; 1.2 Resources and pupil activities; 1.3 Pupils and grouping of pupils for different activities; 1.4 Space and efficiency of operation</p> <p>3.0 THE TEACHER AS AN ORGANISER OF LEARNING OPPORTUNITIES</p> <p>3.1 Finding out what children already think and know; 3.2 Presenting counter demonstrations and arguments, generating cognitive conflict; 3.3 Drawing arguments and evidence together; 3.4 Maximizing children's involvement in their own learning. 3.5 Using context to explain concepts 3.6 Use of analogies (similes and metaphors)</p>	1	<p>John, W. (2000). <i>Science education</i>. New York, NY.</p> <p>Association for Science Education. (1961). <i>Science and education: Ib</i>. London: Murray.</p>
8.	ISC 213	Man in the Environment	<p>The special role of the human animal, ecological concepts, the influence of man on the environment, pollution and conservation.</p> <p>1.0 HUMAN BEINGS AS HIGHER ANIMALS</p>	1	Rasmussen, F. A., Holobinko, P., &

			<p>1.1 Characteristics of primates; the similarities and differences with other animals;</p> <p>1.2 Human beings and other primates. (differences in terms of skeletal structure, size of brain, manipulation and use of tools, language and intelligence).</p> <p>1.3 Application of basic intelligence skills e.g observations, measurement and inquisitiveness.</p> <p>2.0 INTRODUCTORY ECOLOGY</p> <p>2.1 Concept of an ecosystem;</p> <p>2.2 Major ecosystems in Nigeria; deciduous, savannah, and tropical forests;</p> <p>2.3 Physical and biotic factors and uses of smaller ecosystems e.g ponds, streams, farmland, etc;</p> <p>2.4 Relationships between plants and animals, food chains, food webs;</p> <p>2.5 People’s use of land with reference to food production and food chains;</p> <p>2.6 Carbon and nitrogen cycles;</p> <p>2.7 Importance of fertilizers, herbicides and pesticides in food production;</p> <p>2.8 Traditional and modern methods of food preservation</p> <p>2.9 Associations; parasitism, symbiosis and commensalisms.</p> <p>3.0 THE ROLE OF MAN IN RESOURCE DEVELOPMENT</p> <p>3.1 Exploitation of resources by man, such as deforestation, desertification (Definition, causes, effects and control) and mining etc.</p> <p>3.2 Causes of environmental pollution; biological (sewage), chemical (especially fertilizers and power station emissions), thermal, and other e.g oil spillages, slit and other waste from mining.</p>	<p>Showalter, V. M. (1974). <i>Man and the environment</i>. Boston: Houghton Mifflin.</p> <p>Cornwell, A. (1987). <i>Man and the environment</i>. Cambridge: Cambridge University Press.</p>
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9.	ISC 214	Workshop Practice and Laboratory Management	<p>1.0 Laboratory Management</p> <p>1.1 Laboratory rules</p> <p>1.2 Laboratory equipment/apparatus</p> <p>1.3 Storage and management procedures</p> <p>1.4 Parts and sue of microscope, Section Cutting; temporary and permanent preparation of slides.</p>	2	<i>Workshop practice series. (1954).</i>

		<p>1.5 Balances: Parts and manipulation of different types of balances</p> <p>1.6 Preparation of solution – Molar and percentages.</p> <p>1.7 Indicators – pH ranges</p> <p>1.8 Uses of burettes and pipettes and their maintenance</p> <p>1.9 Bunsen burners, flame parts and adjustments.</p> <p>1.10 Glass-blowing.</p> <p>1.11 The accumulator, circuit connection – series and parallel.</p> <p>2.0 SAFETY IN THE ENVIRONMENT</p> <p>2.1 First aids for victims of acid/alkali burns, electric shock and other common accidents, ways/methods of extinguishing fires including oil and electric fires.</p> <p>3.0 WORKSHOP PRACTICE AND SKILL ACQUISITION</p> <p>3.1 Improvisation – definition and its advantages.</p> <p>3.2 Production of improvised materials for teaching Integrated Science at Primary and Junior Secondary School Levels.</p> <p>3.3 Recognition and use of basic carpentry tools in improvisation of science equipments e.g test-tube racks. Acquisition of elementary skills in carpentry.</p> <p>3.4 Using paper work in modelling e.g use of paper-machine</p> <p>3.5 Glass work: Glass-cutting, construction of aquarium etc.</p> <p>3.6 Preparation of skeletons and herbariums.</p> <p>3.7 Elements of painting – types of paints, colour mixing and sign writing.</p> <p>4.0 METAL WORK</p> <p>4.1 Identification and uses of simple instruments used in metal workshop.</p> <p>4.2 Soldering techniques</p>	<p>Woodside, G., & Kocurek, D. S. (1997). <i>Environmental, safety, and health engineering</i>. New York: Wiley.</p>
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			<p>4.3 Welding techniques</p> <p>4.5 Engraving</p> <p>5.0 ELECTRICAL/ELECTRONIC WORK</p> <p>5.1 Meaning of ICT, component of ICT and importance of ICT.</p> <p>5.2 Identification and uses of simple instruments used in electrical workshop.</p> <p>5.3 Simple circuit connection and types</p> <p>5.4 Fuses and uses</p> <p>5.5 Element Electronics</p> <p>5.6 Mechanism of radio and tape recorder and T.V. functions</p> <p>5.7 Wavelengths and channels</p> <p>5.8 Batteries – types, functions and maintenance</p> <p>N.B Students should do a simple project on either of the following.</p> <p>(1) Improvisation of apparatus/equipment for science.</p> <p>(2) Simple experiments to demonstrate scientific processes and principles.</p> <p>6.0 SKILLS ACQUISITION</p> <p>6.1 Meaning and reasons for skill acquisition, the risk, decision making, managing emergency situation, survival strategies and learning together.</p> <p>6.2 Type of skills such as farming, computer literacy, photography, internet browsing, e-mail operation, fax, desktop publishing and networking etc.</p> <p>6.3 Importance of skill acquisition, improvement of quality of life and appreciation of human capability</p>		
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