

SENIOR SCHOOL PATHWAYS

1. ARTS AND SPORTS SCIENCE

Sports
Visual Arts
Performing Arts

2. SOCIAL SCIENCES

Languages and Literature
Humanities
Business Studies

3. STEM

Pure sciences
Applied sciences
Technical and Engineering
Career and Technology Studies

LEVEL LEARNING OUTCOMES FOR SENIOR SCHOOL

By the end of senior school, the learner should be able to:

- Communicate effectively and utilise information and communication technology across varied contexts.
- Apply mathematical, logical and critical thinking skills for problem solving.
- Apply basic research and scientific skills to manipulate the environment and solve problems.
- Exploit individual talents for leisure, self-fulfilment, career growth, further education and training.
- Uphold national, moral and religious values and apply them in day to day life.
- Apply and promote health care strategies in day to day life.
- Protect, preserve and improve the environment for sustainability.
- Demonstrate active local and global citizenship for harmonious co-existence.
- Demonstrate appreciation of diversity in people and cultures.
- Manage pertinent and contemporary issues responsibly.

Sample of Current Course Outline

COURSE OUTLINE

ECT 304: TEACHING METHODS IN BIOLOGY/BIOLOGY METHODS

3 credit hours

RATIONALE

This is a methods course aimed at preparing graduates in the biological sciences to teach biology at secondary school level in Kenya. The course therefore, emphasizes the special methods of teaching biology

PURPOSE

To equip the students with the requisite knowledge, skills, attitudes, values and competencies to enable them understand the principles and practices of teaching biology, a “science of life”. The students will become familiar with various ways and tasks of teaching, plan lessons for various groups of learners and create effective learning environments.

EXPECTED LEARNING OUTCOMES/COURSE OBJECTIVES

By the end of the course, the learners\ should be able to :

- Explain the significance of biology in the school curriculum
- Trace changes that have occurred in the syllabus of biology since independence
- Utilize appropriate strategies and methods in the teaching of biology
- Plan for effective teaching of biology
- Develop and manage teaching/learning resources
- Practice the various techniques and skills acquired during peer and micro teaching sessions
- Develop, administer, mark tests and examination for assessment and evaluation in biology.
- Keep proper records of examination results

COURSE CONTENT/ TOPICS

Biology in the school/curriculum

- Aims and objectives of teaching biology in secondary schools
- The 8 – 4 – 4 secondary school biology syllabus
 - origin
 - objectives

- content at various levels
- changes in biology syllabus since independence.

Teaching strategies /methods /techniques

- Expository strategy – lecture method
 - improved expository approach
- Heuristic strategy - demonstration method
 - practical work/lab work
 - project work
 - field work
- The central role of practical work in teaching biology

Planning for instruction

- The syllabus and its role
- The schemes of work – basic considerations in scheming
 - scheming procedure
- The lesson plan - components, types of lesson plans, sample lesson plans
- Records of work

Assessment and evaluation in biology

- Explain meaning of measurement, evaluation and assessment
- Inter dependence of teaching, evaluation and instructional objectives
- Purpose of assessment in biology
- Assessment methods in biology
 - Observation schedules
 - Written tests and examinations
 - Project work
- Types of teacher prepared tests and their functions
- Planning a test
 - Role of instructional objectives
 - Construction of table of specifications/test grid and its significance
- Preparation of marking schemes

- Test administration
 - Scoring
 - Interpretation of results
- Evaluation techniques in biology
 - Utilization of classroom tests
 - Classroom visits
 - Use of questionnaires
 - Feedback reports from teachers
- Current trends in assessment in biology

Resources and facilities for teaching biology

- Kinds of resources
 - Textbooks
 - Apparatus
 - Chemicals
 - Audio- visual teaching aids
 - Projection equipment
 - Models
 - Realia/real objects/living specimen
- Facilities
 - Biological laboratories – location, layout, management
 - Museum and galleries
 - Botanical garden
 - Aquaria
 - Zoos and game parks
 - Animal houses
- Safety in a biological laboratory and management practices
 - Hazards from laboratory design, chemicals, glassware
 - Bio hazards
 - First aid

Microteaching

- Meaning and significance of micro teaching
- Practice skills of

- Set induction
- Communication
- Illustration
- Questioning
- Reinforcing
- Motivating
- Stimulus variation
- Closure
- Integrated skills

Assessment of course

1. Two continuous assessment tests of 10 marks each = 20%
2. Micro/peer teaching = 10 %
3. Final examination = 70%

Mode of teaching

Lectures, project work, simulation, directed reading, micro/peer teaching – practical sessions, seminars, individualized learning, problem – solving, group discussions.

Instructional materials/equipment

- Chalk/white board
- Projection equipment
- Text books
- Handout and pamphlets
- Film on micro teaching skills

References

Benjamin Bloom. (1981). Evaluation to improve learning. Macgraw – Hillbook company

Borich .G.D.(1987). Educational testing and measurement. Scott Foreman

Dallas.D.(1980). Teaching Biology Today. Hutchinsons and co – publishers

Falk D.F.(1971). Biology Teaching methods. John Wiley and sons ltd

Sambili H.J; maundu J.N; Muthwi s.m.(1998). Biology Education : A methodological approach.

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Tanner, K.D and Allen, D.E(2002). A pproaches to Biology teaching and leaning

Sample of Proposed CBC aligned Course Outline



SCHOOL OF EDUCATION

**COMPETENCY – BASED COURSE OUTLINE AND INSTRUCTIONAL DESIGN
DEPARTMENT OF CURRICULUM, INSTRUCTION AND EDUCATIONAL
TECHNOLOGY**

**BACHELOR OF EDUCATION (SCIENCE) & BSC. AGRICULTURAL
EDUCATION AND EXTENSION**

ECI B302: SUBJECT METHODS (BIOLOGY)

This course is designed to provide a capstone experience. Its purpose is two pronged. First is to tie materials covered in previous institutional courses in the Bachelor of Education (Science) and Bsc. AGED programs at Pwani University (PU). Second, to integrate and expand students' knowledge of concepts, approaches, methods and techniques of teaching Biology in Secondary schools and post-secondary institutions. The course consists of two components. The first is a discourse designed to explore basic ,advanced and emerging issues in the area of teaching Biology. Topics will include Biology in the school curriculum, instructional approaches/methods/techniques for learning of Biology, planning for instruction in Biology, assessment and evaluation in Biology, resources and facilities for teaching Biology. Teachers who have vast experience will be invited to collaborate in teaching students.

The second is a micro teaching hands-on learning experience for acquisition of specific teaching skills such as set induction, verbal exposition, illustration, questioning, reinforcement, stimulus variation, motivation, communication, creativity, integration of skills and closure. Students will work on a real world simulation project in which they will develop schemes of work, lesson plans, teaching/learning resources,

teach peers, review individual/group performances, revise them. Along with the project, the course includes weekly discussions and presentations with an emphasis on student choice and active participation.

Prologue

This course outline is specially designed to address the following questions;

1. What content is needed to support the development of the competency in the curriculum?
2. What instructional strategies are effective in developing the competency?
3. What competences, pertinent and contemporary issues as well as values should be acquired, addressed and inculcated through this course.

Expected learning outcomes

The learners should be able to

- Communicate acquired technical and professional competencies necessary for teaching Biology in junior and senior secondary level.
- Collaborate ,plan and teach effectively at appropriate learners' level.
- Create, select, prepare and safely use teaching and learning resources for teaching Biology.
- Critically think, explore, manipulate, manage and provide learning environments conducive for learners' holistic development.
- Practice relevant teaching approaches, methods, skills, technologies and tasks.
- Develop capacity for Biological inquiry, decision making and problem solving.
- Apply acquired skills and competencies to assess, evaluate and report acquisition of knowledge, attitudes and skills of learners in Biology.

Core Competencies to be Developed

1. **Communication:** Trainee teachers/students prepare written reports and orally present to the other group members on various aspects of the course in Biology Education. This will apply to project work involved in micro-teaching.

2. **Collaboration:** Students will work in groups as they carry out various tasks including; planning for teaching, preparation of teaching/learning resources, actual teaching and post teaching phase activities in Biology.
3. **Critical thinking:** Students to think out/work out solutions to learning challenges as they practice teaching skills thus develop right value and attitudes appropriate for the teaching of Biology.
4. **Creativity:** Students to imagine and simulate use of knowledge gained in new hypothetical school situations to advise on requirements for effective and the importance of teacher-learner-content-equipment interaction in learning Biology.
5. **Citizenship:** Trainee teachers to use knowledge gained, skills and attitudes developed to help solve community problems related to teaching and learning of Biology.
6. **Digital Literacy:** Trainee teachers to use digital devices to research, analyze information, generate knowledge, write and present project reports on/in Biology Education.
7. **Self-efficacy:** Trainees to liaise with others in group work to unearth their strengths and weaknesses as they witness individual differences in performance of similar tasks. Use of structured group work will allow each student role play based on their strength. They will appreciate that professional hands are differently competent thus need to complement each other.
8. **Learning to learn:** Students to search for more information through self-study (heutagogy) and experimentation thus develop capacity for continuous learning.

Values

1. **Respect:** Students to accommodate divergent opinions of others as they work together in groups and practical activities.
2. **Responsibility:** Students to behave with decorum while working in groups and playing different roles for example teacher/learner during microteaching.
3. **Peace & Unity:** Students to equitably share responsibilities in group work.
4. **Integrity:** Students to be accurate, pedantic and truthful in reporting findings from research, experimentation ,assignments and other discovery activities.
5. **Social Diligence:** Students to observe equity, equality and gender consideration in sharing and distribution of roles, responsibilities, tasks and resources.

PCIs (Pertinent and Contemporary issues).

1. **Disaster risk Reduction:** Safety precautions as they carry out activities for example. Covid-19 MOH protocols be observed. Safety precaution in micro-teaching laboratory be observed too.
2. **Environmental Issues:** Safe disposal of waste materials from micro-teaching lab work to conserve environment. Awareness and sensitivity be promoted.
3. **Financial Literacy:** Practical application of knowledge, skills and attitudes acquired to help learners-tuition/remedial at some fee and benefit from economic use of resources.
4. **Life skills:** develop decision making & problem solving skills as demands of life as they work on their projects, assignments, tasks, reports.
5. **Health Education:** Use of knowledge acquired to keep healthy.

Links to other Learning Areas

Health education, and humanities, sports

Community Service learning

Learners will be encouraged to interact with members of the community. Practical participation in public health matters

Course Structure and Design

Content	Competence	Methodology	Teaching/Learning Resources	Key Inquiry Questions	Evaluation
Purpose and Objectives of Teaching Biology in Secondary Schools.	Teach Content Of Biology In Appropriate Context.	-Lecture -Discussion - Demonstration -Team-Teaching	<ul style="list-style-type: none"> • Course Module • Handouts • Reference Books 	Why teach Biology?	Oral Questions
Historical Development Of Biology Curriculum	Communicate Evolution Of Biology Curriculum	-Lecture -Discussion -Historical	<ul style="list-style-type: none"> • Mind Map Charts • LCD Projector 	What factors have necessitated	<ul style="list-style-type: none"> • Mind Mapping

m In Kenya		Method -Symposium - Biographical Method -Power Point Projections		the development of the Biology Curriculum?	<ul style="list-style-type: none"> • Term Paper Assignment
Current Secondary School Biology Syllabus	Understand The Nature And Structure Of Content And Context For Teaching Biology	-Whole Class Discourse -Assignment method -Power Point Presentations - Deductive/Analytic method/Rule Method	<ul style="list-style-type: none"> • LCD Projector • Flip Charts 	What are the strengths and weaknesses of the current Biology curriculum?	Concept Mapping
Institutional Methods Appropriate For Biology	Choose And Utilize Appropriate Method Based On Content And Expected Learning Outcomes.	-Mind Mapping -Research and Presentations - Assignment Method -Heuristic method/discovery	<ul style="list-style-type: none"> • Flip Charts • LCD Projector 	What makes each of the suggested methods of teaching Biology	<ul style="list-style-type: none"> • Term Paper • Assignment
Planning For Teaching Of Biology	Plan For Effective Teaching	-Project Work -Demonstration -Personalized instruction -Micro teaching Laboratory	<ul style="list-style-type: none"> • Samples Of Schemes Of Work • Lesson Plans And Records Of Work 	Why should we plan for teaching?	Practical Work Approach

		-Panel discussion -Inductive /synthetic method			
Assessment And Evaluation In Biology	Prepare And Administer Tests And Exams Mark Exams Report Learners Academic Performance	-Project Work Method -Demonstration -Personalized instruction -Simulation	<ul style="list-style-type: none"> • Sample Table Of Specifications • Marking Scheme • Learner Academic Report 	Why should we assess Biology?	Practical Work Approach
Micro Teaching Skills And Teaching Practice	Practice Peer Teaching For Skills Development Carryout Lesson Evaluation For Self And Peers.	-Simulation -Demonstration - Reflection/Feedback -Scientific method	<ul style="list-style-type: none"> • Micro Teaching Laboratory • Manila Papers • Realia 	What is the importance of micro-teaching?	Practical Work Approach

Course assessment

This course will be assessed through practical work approach inform of assignments, adoption of teaching and learning resources and micro-teaching. Weighting for assignments will be 30% and end of semester will be 70% of the final mark. This course will be passed at 40% mark. The course is a perquisite foe teaching practice.

Core Texts and References Materials

1. Skinner, N. (2020). Teaching biology in schools: global research, issues and trends: edited by K. Kampourakis and MJ Reiss, London and New York, Routledge, 2018.
2. Dung, P. C. (1989). Biology teacher training: Preparing students for tomorrow. *High-School Biology Today and Tomorrow*, 213.
3. Guskey, T. R. (2002). Professional development and teacher change. *Teachers and teaching*, 8(3), 381-391.
4. Namasaka. F (2020). Building Capacity for Great Teaching and Facilitation: How Great Instructors Do It. Amazon. ISBN-10 : 6200473331.
5. Namasaka. F (2020). Teaching Practice: Remedy for the 35 Common Errors Student Teachers Make Paperback Amazon. ISBN-10 : 6202518049.
6. Wood, W. B. (2009). Innovations in teaching undergraduate biology and why we need them. *Annual Review of Cell and Developmental*, 25, 93-112.
7. Eichman, P. (1996). Using history to teach biology. *The American Biology Teacher*, 200-204.