



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION
SCIENCE
4TH YEAR 1ST SEMESTER 2013/2014 ACADEMIC YEAR
MAIN SCHOOL BASED

COURSE CODE: SBT 402

COURSE TITLE: MORPHOGENESIS AND ANATOMY

EXAM VENUE: CR 1

STREAM: (BED)

DATE: 03/05/14

EXAM SESSION: 9.00 – 11.00 AM

TIME: 2.00 HOURS

Instructions:

- 1. Answer ALL Questions in Section A and ANY other 2 questions**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

SECTION A: (30 MARKS)

1. List THREE differences in the reproduction of gymnosperms and angiosperms. (3 marks)
2. Describe Vochting's experiment on polarity in plants. (3 marks)
3. Illustrate the torpedo stage embryo of *Arabidopsis thaliana*. (3 marks)
4. List the functions of the below listed gene transcripts in maize embryogenesis listed below (3 marks)
 - a. ZmHOX
 - b. LPT2
 - c. ZmOCL
5. Distinguish between dichotomous and monopodial branching in plants. (3 marks)
6. Describe the open and closed apical organisation in roots. (3 marks)
7. Explain the different types of symmetry observed in plants (3 marks)
8. Illustrate the structure of gymnosperm microsporophyll. (3 marks)
9. Explain how reconstitution is achieved in plants (3 marks)
10. Explain the processes that take place during the following stages of leaf development.
 - a. Leaf initiation (1 mark)
 - b. Primary morphogenesis (1 mark)
 - c. Expansion and secondary morphogenesis (1 mark)

SECTION B: (40 MARKS)

11. Discuss the different types of abnormal growth in plants. (20 marks)
12.
 - a. Describe the different types of meristems in a plant body. (6 marks)
 - b. Discuss apical organisation in plants based on:
 - i. The apical cell theory (4 marks)
 - ii. Histogen theory (4 marks)
 - c. Describe the cytological zonation of shoot apices in gymnosperms. (6 marks)
 - d. Discuss the different correlations that are observed in plants. (20 marks)
 - e. Discuss the role of light, water and temperature as morphogenetic factors. (20 marks)

COURSE OUTLINE

SBT 402: MORPHOGENESIS AND ANATOMY

Instructor: Mr. Alfred Ochieng' Oluoch

Contacts: Mobile: +254 714 172292

Email: aochieng@bondo-uni.ac.ke

Class hours: As per the timetable.

Office Hours: Monday, Tuesday and Wednesday 09:00 – 11:00 (*for student guidance*)

Prerequisite units:

SBT 101: Plant Structure and Function

SBT 301: Plant Growth and Development

Purpose of the course:

This course aims to teach the students about the morphogenesis of plant tissues and anatomy in plants.

Expected Learning Outcomes of the Course:

At the end of this course, the students should be able to demonstrate the following:

- 1) **Knowledge and understanding:** An understanding of:
 - a) The morphogenesis of plants tissues from meristematic cells
 - b) The anatomy of plants tissues.
- 2) **Skills:** The students should be able to:
 - a) Section plant tissues
 - b) Competently use microscopes to examine sectioned plant tissues
 - c) Demonstrate plant tissue culture techniques.

Course Content:

Reproduction morphology: The male and female gametophyte, fertilization endosperm development and applied embryology, organogenesis and development; differentiation and structure in the shoot and root apex, organization of plant tissues, abnormal plant growth and tissue culture studies of morphogenesis.

Teaching Schedule:

WEEK	COURSE CONTENT
1	Reproduction morphology: Gymnosperm and angiosperm floral structure,

	gametogenesis and fertilization and endosperm development.
2	Model embryonic systems: Maize and Arabidopsis embryogenesis.
3	Introduction to cellular, genetic and molecular mechanisms of plant embryogenesis.
4	Phenomena of morphogenesis: Polarity and symmetry.
5	Phenomena of morphogenesis: Differentiation and regeneration.
6	C.A.T 1, Shoots: Apical meristems, leaf primordia, intercalary meristems.
7	Roots: apical meristems, the quiescent center, primary tissues and tissue regions, development of primary tissues.
8	Vascular cambium: structure and function, xylems and phloems.
9	Unusual features of structure and development in stems and roots
10	Leaves: Basic leaf structure, Leaf development, The role of the cytoskeleton in leaf development, The role of genetics in leaf development, Variations in leaf form, structure, and arrangement
11	Plant tissue studies of morphogenesis
12	C.A.T 2 and revision

Mode of Delivery:

The course will be delivered through lectures, assignments, practical classes and tutorials.

Instructional Materials and/or Equipment:

Textbooks, handouts and microscopes.

Course Assessment:

The assessment strategy will be geared towards evaluating whether the students have attained the set out learning outcomes. The students will be tested on;

- Their knowledge and understanding of the course content based on the outcomes of assignments, group exercises and continuous assessment tests (CATS).
- Their grasps of practical skills based on the outcomes of laboratory exercises and reports.
- Their self learning skills as well as their ability to present and communicate scientific ideas based on individual and group assignments.

Core Reading Materials

1. Beck, C.B. 2010. An Introduction to Plant Structure and Development. Plant Anatomy for the Twenty First Century. 2nd Edition. Cambridge University Press.
2. Sinnott, E.W. 1960. Plant Morphogenesis. McGraw-Hill

Recommended reference materials

1. Evert, R.F 2006. Esau's Plant Anatomy.
2. Cutler, D.F., Botha, CEJ. and Stevenson, D.W. 2007. Plant Anatomy. An applied Approach. Blackwell Publishing
3. Suarez, M.F and Bozhkov, P.V. (eds) 2008. Plant Embrogenesis: Methods in Molecular Biology. Humana Press.

Prepared by:

Signature: Date:

Approved by Dean, SBPS

Signature: Date: