

Tutorial Letter 101/3/2018

Plant Structure BOT1501

Semesters 1 and 2

Department of Life and Consumer Sciences

This tutorial letter contains important information
about your module.

BARCODE

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1 INTRODUCTION AND WELCOME

Dear Student

Welcome to the Department of Life Sciences and in particular to the Botany Section. We hope you will find this academic year stimulating and satisfying.

The subject of Botany consists of several sections and at first you may find the course difficult, but I want to assure you that, as you make progress in your studies, all the aspects of Botany will become clear and understandable.

Your study of this module will be satisfying if you are DEVOTED and pay REGULAR attention to your study.

The staff of the Botany Section of the Department of Life Sciences (Botany) would like to assist you and we encourage you to contact us early if you experience any problems with this module. The information supplied for the module will include tutorial matter such as the following:

1.1 Tutorial matter

The information supplied for the module will include the following tutorial matter:

- Tutorial Letter 101
- Study guide

Some of this tutorial matter may not be available when you register. Tutorial matter that is not available when you register will be posted to you as soon as possible, but is also available on *myUnisa*.

You are reminded about the importance of *myUnisa* and regular use of the internet. You must be registered on *myUnisa* to be able to submit assignments, to have access to the Library functions, download study material, “chat” to your lecturers or fellow students, participate in online discussion forums and get access to all sorts of learning resources.

2 PURPOSE OF AND OUTCOMES FOR THE MODULE

2.1 Purpose

The purpose of this module is to introduce you to botany and its development as a life science. The guide helps you to achieve insight into the building blocks of botany and the links of these blocks. It must be understood that module BOT1501 is only a part of the Botany course. The whole part is divided into different modules, from module BOT1501 to module BOT3704. All aspects of Botany are covered in various modules.

2.2 Outcomes

After working through this module, you should be able to

- compare the structures and functions of prokaryotic and eukaryotic cells
- discuss the structures and functions of primary and secondary cells and tissues
- explain the structures and functions of the normal and modified plant organs that plant bodies consist of
- draw a diagram of the life cycle of the flowering plants

- reflect on the relationship of flower morphology to the types of seeds and fruit and fruit that are produced
- summarise the importance of plants for sustaining life on earth
- formulate answers to questions through reading, understanding and integrating information, which could develop into the ability to apply conventional methods and basic technologies
- to submit the results of basic research in as scientific manner to peers and other professional people
- discuss the evidence of evolution and the main evolutionary mechanisms that lead to new species

3 LECTURER AND CONTACT DETAILS

3.1 Lecturers

Mr AR Mudau Cand.Sci.Nat. (Botany)
 Email address: mudauar@unisa.ac.za
 Telephone number: +2711 471 3921

3.2 Department

Department of Life and Consumer Sciences
 Florida Campus
 Private Bag X6, Florida, 1710
 Fax number: +27 11 471 2796

3.3 University

You will find general Unisa contact details in the *myStudies @Unisa* brochure. Keep your student number at hand when contacting the University.

4 MODULE RELATED RESOURCES

4.1 Prescribed books

Graham, L.E., Graham, J.M., Wilcox, L.W., 2014. Plant Biology: New International Edition, 2nd Edition. Pearson. ISBN 978-1-292-04249-7.

Prescribed books can be obtained from the University's official booksellers. If you have difficulty in locating your book(s) at these booksellers, please contact the Prescribed Book Section at tel 012 429 4152 or e-mail vospresc@unisa.ac.za.

4.2 Recommended books

None

4.3 Electronic Reserves (e-Reserves)

None

5 STUDENT SUPPORT SERVICES FOR THE MODULE

Important information appears in your *my Studies @ Unisa* brochure.

6 MODULE SPECIFIC STUDY PLAN

Use your *my Studies @ Unisa* brochure for general time management and planning skills.

Study table, with dates

Activity

To successfully prepare for and submit your assignments you have to work according to a time table. **Use the following table or draw up your own table** to schedule your studies for this subject. This table starts after closing of registration; if you register early, adjust the dates.

STUDY UNIT	SECTION	CONTENT to study with	Week	Date
1 INTRODUCTION: THE WORLD OF PLANTS	1	The importance of plants	1	4–10 February
	2	Plant characteristics and diversity		
	3	Botany and the scientific method		
2 THE STRUCTURE OF CELLS AND THE CELL CYCLE		Week 2	2	11–17 February
	1	An overview of cells	3	18–24 February
		Week 3		
	2	Major plant cell organelles		
	3	The cytoskeleton: controlling cell shape and environment		
	4	Membrane and cell walls	4	25 Feb–3March
		Week 4		
5	The cell cycle and cell division			
3 AN INTRODUCTION TO PLANT STRUCTURE		Week 5	5	4–10 March
	1	Basic types of plant cells		
	2	Tissues of vascular plants		
	3	An overview of vascular plant organs		
	4	An overview of plant growth and development		
4 ROOTS, STEMS AN LEAVES: THE PRIMARY PLANT BODY		Week 6	6	11–17 March
	1	Roots	7	18–24 March
	2	Stems		
		Week 7		
	3	Leaves		

5 SECONDARY GROWTH IN PLANTS				
		Week 8	8	25–31 March
	1	Secondary growth: an overview		
	2	Growth patterns in wood and bark		
3	Commercial uses of wood and bark			
6 LIFE CYCLES AND REPRODUCTIVE STRUCTURES		Week 9	9	1–7 April
	1	Plant reproduction: an overview		
		Week 10	10	8–14 April
	2	Meiosis and alternation of generations		
	3	Cone and flower structure		
	4	Seed structure		
5	Fruit structure			
7 EVOLUTION		Week 11	11	15–21 April
	1	History of evolution		
	2	Mechanisms of evolution		
	3	The origin of species		
8 CLASSIFICATION		Week 12	12	22-28 April
	1	Classification before Darwin		
	2	Classification and evolution		
	3	Major groups of organisms		

7 MODULE PRACTICAL WORK AND WORK INTEGRATED LEARNING

Module BOT1501 is a theoretical module. NO practical session is included. All the practical work based on the theory of this module is included in the BOT1603 (old code BOT1343) module. It is therefore recommended that you also register for the practical module BOT1603 as some of the work which may not be fully understood in the theory, will become clear during the practical sessions.

8 ASSESSMENT

8.1 Assessment plan

The assessment in this module is both formative and summative. At the end of each study units there are self-evaluation questions. There are two assignments which you should submit before the due dates. At the end of each semester you will write the examination. The assignment 1 and 2 will contribute 20% and 80% towards semester mark, respectively. Both Assignment 01 and 02 combined contribute 30% towards the final mark and the examination 70%.

Please note: Although students may work together when preparing assignments, each student must write and submit his or her own individual assignment. In other words, you must submit your own ideas in your own words, sometimes interspersing relevant short quotations that are properly referenced. It is unacceptable for students to submit identical assignments on the basis that they worked together.

8.2 General assignment numbers

There are two assignments for both semesters, namely Assignment 01 and Assignment 02. If you are registered for semester 1 you should only submit assignments for that semester. You are not allowed to submit the assignments for the semester which you are not registered for.

8.2.1 Unique assignment numbers

SEMESTER 1:

Assignment 01: 798270

Assignment 02: 601318

SEMESTER 2:

Assignment 01: 814782

Assignment 02: 821038

8.2.2 Due dates of assignments

SEMESTER 01:

Assignment 01: Due date: 28 March 2018

Assignment 02: Due date: 13 April 2018

SEMESTER 02:

Assignment 01: Due date: 23 August 2018

Assignment 02: Due date: 27 September 2018

8.3 Submission of assignments

You may submit written assignments and assignments done on mark-reading sheets either by post or electronically via *myUnisa*. Assignments may **not** be submitted by fax or email. For detailed information on assignments, please refer to my *Studies @ Unisa* brochure, which you received with your study package. To submit an assignment via *myUnisa*:

- Go to *myUnisa*.
- Log in with your student number and password.
- Select the module.
- Click on assignments in the menu on the left-hand side of the screen.
- Click on the assignment number you wish to submit.
- Follow the instructions.

8.4 Assignments

See page 10

9 OTHER ASSESSMENT METHODS

None.

10 EXAMINATION

Use your *my Studies @ Unisa* brochure for general examination guidelines and examination preparation guidelines.

For **examination admission** it is compulsory for you to hand in the first assignment for this course (BOT1501). It is also to your own advantage to do the assignments in order to test your understanding of the subject, and to establish how well prepared you are for the examination. You need to obtain **a minimum of 40%** in your examination to pass. If you failed to do that and want admission to a supplementary examination, the total of your examination mark and year mark needs to be over 40%.

Examination period

This module is offered in a semester period of 15 weeks (12 weeks of study and three weeks of examination period). This means that if you are registered for the first semester, you will write the examination in May/June 2018 and the supplementary examination will be written in October/November 2018. If you are registered for the second semester, you will write the examination in October/November 2018 and the supplementary examination will be written in May/June 2019.

During the semester, the Examination Section will provide you with information regarding the examination in general and examination venues, dates and times.

To help you in your preparation for the examination, you will receive a tutorial letter that will explain the format of the examination paper, give you examples of questions that you may expect and set out clearly what material you have to study for examination purposes.

Calculating your final mark:

Year mark (marks for your assignments) = 30%

Examination = 70%

Total = 100%

11 FREQUENTLY ASKED QUESTIONS

The brochure *my Studies @ Unisa* contains an A-Z guide of the most relevant study information.

Q: How do I know where to write examinations?

A: After you have registered you will be informed by the examination department about the venues (examination centres) where you will sit for your exams.

Q: Where do I get additional information about the modules I have registered for?

A: For each module you have registered for there is additional information on *myUnisa*.

Q: How do I submit my assignment via *myUnisa*?

A: For detailed information on and requirements as far as assignments are concerned, see the brochure *my Studies @ Unisa* that you received with your study material.

12 SOURCES CONSULTED

These sources are provided in Tutorial letter 101 guidelines.

13 IN CLOSING

I hope and trust that you will enjoy the course. Please do not hesitate to contact us if you experience problems. Good luck with your studies.

14 ADDENDUM

It is incumbent of all of us to behave ethically and so I would seriously remind you of a major problem regarding unethical behavior in education, namely plagiarism.

Assignment 01

DUE DATE: 28 March 2018

Unique mark-reading sheet number: 798270

MULTIPLE CHOICE QUESTIONS

INSTRUCTIONS

Fill in your name and student number on the mark reading sheet. Choose the best answer for each of the following questions. Indicate the correct answer clearly by shading in the appropriate number on the mark reading card. If more than one number is shaded in, in any answer, NO marks will be awarded for the question.

Question 1

Storage, secretion, photosynthesis are the functions of _____.

1. collenchyma
2. vessel elements
3. lateral meristems
4. sclerenchyma
5. parenchyma

Question 2

Plants with an alternate leaf arrangement have

1. blades divided into two or more leaflets.
2. major veins that radiate out from one point.
3. one leaf at each node.
4. major veins branching off along the entire length of the midvein.
5. two leaves at each node.

Question 3

The three main functions of stems are

1. support, conduction, and photosynthesis.
2. support, anchorage in the soil, and production of new living tissue.
3. conduction, production of new living tissues, and sexual reproduction.
4. conduction, asexual reproduction, and sexual reproduction.
5. support, conduction, and production of new living tissue.

Question 4

Carbon, hydrogen, oxygen, nitrogen, and potassium are examples of _____ for plants.

1. macronutrients
2. micronutrients
3. trace elements
4. essential elements
5. Both a and d

Question 5

The two lateral meristems responsible for secondary growth are the

1. cork cambium and apical meristem.
2. apical meristem and cork parenchyma.
3. vasculars vascular cambium and apical meristem.
4. vascular cambium and cork cambium.
5. cork cambium and cork parenchyma.

Question 6

The photosynthetic ground tissue in the middle of the leaf is called _____.

1. cutin
2. mesophyll
3. the abscission zone
4. subsidiary cells
5. palisade and spongy stomata

Question 7

All stems have undeveloped embryonic shoots called _____.

1. lenticels
2. buds
3. lianas
4. phloem fiber caps
5. periderm

Question 8

Plants that complete their life cycles in one year are called _____; those that complete them in two years are _____; and those that live year after year are _____.

1. annuals; perennials; biennials
2. biennials; annuals; perennials
3. annuals; biennials; perennials
4. perennials; annuals; biennials
5. perennials; biennials; annuals

Question 9

Leaves have a trade-off, or comprise, between photosynthesis and transpiration, which results from

1. the numerous stomatal pores that provide both gas exchange for photosynthesis and openings through which water vapor escape.
2. the secretion of a waxy layer, the cuticle that reduces water loss.
3. blue light triggering an influx of potassium ions (K^+) into the guard cells.
4. the abscission of leaves of deciduous plants as winter approaches in the temperature climates.
5. the stomata being closed at night, although water continues to move into the roots by osmosis.

Question 10

The monocot stems in which the vascular tissues are embedded is _____.

1. cork cambium
2. cortex
3. ground tissue
4. pith
5. phloem

Question 11

A _____ strip in endodermal cell walls forces water and solutes to move through root cells, not around them.

1. cutin
2. lignin
3. casparian
4. cellulose
5. cuticle

Question 12

Plant biotechnology and the development of genetically modified (GM) plants can provide _____.

1. more nutritious food
2. herbicide-resistant plants
3. new sources of vaccine
4. pest-resistant plants
5. All of the above.

Question 13

Biologists define a species as a population of organisms that are

1. actually or potentially interbreeding.
2. undergoing rapid mutation.
3. reproductively isolated from other populations.
4. identical to one another.
5. Both 1 and 3 are correct.

Question 14

The _____, which bears flowers, roots, stems, and leaves, dominates the life cycle of flowering plants.

1. sporophyte
2. gametophyte
3. sporangium and its derivatives
4. gametangium and its derivatives
5. gamesporophyte

Question 15

Which of the following is *not* an adaptation of pine needle to conserve water?

1. Less surface area exposed to the air than thin-bladed leaves.
2. A relatively thick cuticle.
3. Sunken stomata
4. Netted veins instead of parallel veins.
5. Both c and d are not adaptations of pine needles.

Question 16

The nutrition of some plants depends on a root-fungus association known as a _____.

1. root nodule
2. mycorrhiza
3. root hair
4. root hypha
5. All of the above.

Question 17

A cladogram

1. is typically produced from a character table.
2. is a kind of phylogenetic tree.
3. depicts possible evolutionary relationships among organisms.
4. is constructed using outgroups and ingroups.
5. Has all of the above features.

Question 18

The protective outer layer of cells covering herbaceous stems is _____.

1. periderm
2. cork cambium
3. lateral meristem
4. epidermis
5. bud scale

Question 19

At night, most plants lose _____, and _____ accumulates.

1. carbon dioxide; oxygen
2. water; oxygen
3. oxygen; water
4. oxygen; carbon dioxide
5. energy; water

Question 20

The flowers of many species coevolved with insects, birds, and other agents that function as _____.

1. pollinators
2. fertilizers
3. messengers
4. co-pollinators
5. None of the above.

END OF ASSIGNMENT 01 (SEMESTER 1)

TOTAL: 20 Marks

ASSIGNMENT 02**Unique assignment number: 601318****DUE DATE: 13 APRIL 2018****INSTRUCTIONS**

It is advisable to keep a copy of your answers.

- Number the questions in the same way as on the assignment.
- Answer ALL the questions

QUESTION 1

Distinguish or explain the difference between the following:

- | | |
|--|-----|
| 1.1 Primary and secondary growth | (4) |
| 1.2 Taproot and fibrous root systems | (4) |
| 1.3 Heartwood and sapwood | (4) |
| 1.4 Simple and multiple fruits | (4) |
| 1.5 Pericycle and endodermis | (4) |
| 1.6 Bottleneck effect and genetic effect | (4) |

[24]**QUESTION 2**

- | | |
|--|-------------|
| 2.1 Name and describe the three types of symbiosis. | (9) |
| 2.2 Is the following structures a root, stem or leaf and what is its function?
a. Haustoria
b. Rhizome
c. Stipule spine | (3 x 2 = 6) |
| 2.3 Use a table to compare the different phases of mitosis and meiosis. | (16) |
| 2.4 List five characteristics that are commonly used to distinguish plants from other organisms. | (10) |

[41]

QUESTION 3

3.1 Describe the structure and function of five types of modified roots. (20)

3.2 Describe the three tissue systems that exist in leaves, stem and roots, in terms of cell types and functions. (15)

[35]

TOTAL: 100 Marks

END OF ASSIGNMENT 02 (SEMESTER 01)

SEMESTER 2

ASSIGNMENT 01

Unique assignment no: 814782

DUE DATE: 23 AUGUST 2018

MULTIPLE CHOICE QUESTIONS INSTRUCTIONS

Fill in your name and student number on the mark reading sheet. Choose the best answer for each of the following questions. Indicate the correct answer clearly by shading in the appropriate number on the mark reading card. If more than one number is shaded in, in any answer, NO marks will be awarded for the question.

Question 1

Minute pores known as _____ dot the surface of the epidermis of the leaves and stems; each pore is bordered by two _____.

1. stomata; guard cells
2. stomata; fibers
3. sieve tube members; companion cells
4. sclereids; guard cells
5. stroma; guard cells

Question 2

Place the following events of stomatal opening in correct order.

(A) proton pump moves H^+ out of guard cells (B) guard cells change shape and pore appears
(C) leaf is exposed to light (D) water diffuses into guard cells
(E) K^+ actively transported into guard cells

1. A-E-D-B-C
2. E-C-D-B-A
3. A-C-D-B-E
4. C-E-A-B-D
5. C-A-E-D-B

Question 3

Horizontal movement of materials in woody plants occurs in

1. bud scales
2. cortex
3. rays
4. lenticels
5. pith rays

Question 4

In daytime, most plants lose _____ and take up _____.

1. water; carbon dioxide
2. water; oxygen
3. carbon dioxide; oxygen
4. carbon dioxide; water
5. Both 1 and 2

Question 5

The non-cellular layer of wax secreted by the epidermis over its surface is called _____.

1. lignin
2. cuticle
3. periderm
4. cellulose
5. trichome

Question 6

How does increasing solute concentration affect water potential?

1. Water potential becomes more positive.
2. Water potential becomes more negative.
3. Water potential becomes more positive under certain conditions and more negative under other conditions.
4. Water potential is not affected by solute concentration.
5. Water potential is always zero when dissolved in water.

Question 7

The _____ encircle a vein.

1. palisade mesophyll
2. guard cell
3. bundle sheath
4. blade
5. cuticle

Question 8

Conduction of water and nutrient minerals in the xylem occurs in vessel elements and _____.

1. sieve tube members
2. tracheids
3. collenchyma
4. cork cells
5. phloem

Question 9

Most stomata are usually located in the _____ of the leaf.

1. upper epidermis
2. lower epidermis
3. cuticle
4. spongy mesophyll
5. palisade mesophyll

Question 10

Water transport from root to leaves is explained by

1. the pressure flow theory.
2. differences in source and sink solute concentrations.
3. the pumping force of xylem vessels.
4. the cohesion-tension theory.
5. All of the above.

Question 11

The nutrition of some plants depends on a root-bacterium association known as a _____.

1. root nodule
2. mycorrhiza
3. root hair
4. root hypha
5. bacteriology

Question 12

Which of the following problems has/have been addressed through the development of genetically modified plants?

1. Vitamin deficiencies in children.
2. Susceptibility of crops to insect pests.
3. Accumulation of toxic ions in agricultural soils.
4. Both 1 and 2 are correct.
5. Women menstruation cycle.

Question 13

Plants are a source of _____.

1. oxygen
2. fossil fuels
3. spices
4. alkaloids
5. All of the above.

Question 14

Which statement is false about photosynthesis?

1. It produces most of the world's oxygen.
2. It is a process by which plants use solar energy, carbon dioxide and water to produce sugars.
3. Unlike plants, all fungi are not photosynthetic.
4. Because of their capacity for photosynthesis, plants are called autotrophs.
5. None of the above.

Question 15

The primary function of the spongy mesophyll is

1. reduction of water loss from the leaf surface
2. changing the shape of the guard cells
3. support to prevent the leaf from collapsing under its own weight
4. diffusion of gases within the leaf
5. deterrence of herbivores

Question 16

Which of the following topics might a botanist be likely to study?

1. Endangered species.
2. The effects of particular hormones.
3. The development of new varieties of crops.
4. Plant life cycles.
5. All of the above.

Question 17

Which of these statements is **NOT** true about the human use of plants?

1. Most of our food ultimately comes from just a few kinds of plants.
2. Some alkaloids have important uses as medicines.
3. Wood consists of the dead cells of certain plants.
4. Poisonous plants cannot harm human.
5. Plants are the source of spices and many alcoholic drinks.

Question 18

Which of the following is a mechanism of water movement in xylem that does not generate sufficient force to explain the rise of water to the tops of the tallest tree?

1. Pressure flow hypothesis
2. Tension-cohesion
3. Root pressure
4. Active transport of potassium into guard cells
5. Transpiration

Question 19

Development of a new plant from a tissue or structure that drops or is separated from the parent plant is called _____ .

1. parthenogenesis
2. exocytosis
3. vegetative propagation
4. nodal growth
5. fission

Question 20

Cotyledons develop as part of all flowering plant _____.

1. seeds
2. embryos
3. fruits
4. ovaries
5. filaments

TOTAL: 20 Marks

END OF ASSIGNMENT 01 (SEMESTER 2)

SEMESTER 2

ASSIGNMENT 2

Unique assignment number: 821038

DUE DATE: 27 SEPTEMBER 2018

INSTRUCTIONS

It is advisable to keep a copy of your answers.

- Number the questions in the same way as on the assignment.
- Answer ALL the questions

QUESTION 1

Fill in the missing word/s in the statements below. Write down the question number and the answer only, e.g. 1.1 spore. DO NOT REWRITE THE WHOLE SENTENCE.

- 1.1 In plants, photosynthesis occurs in organelles called
- 1.2 Stacks of thylakoids in a chloroplast are called
- 1.3 A group of cells that have the same function is called a
- 1.4 Thin, coiling structures that attach some plants to supports are called
- 1.5 The older xylem at the centre of the tree trunk is called the
- 1.6 Natural rubber is obtained from _____ produced by rubber trees.
- 1.7 Parenchyma cells that are specialised for photosynthesis are called
- 1.8 Collectively, the petals of a flower are called the
- 1.9 Fruits that form from the ovary plus other flower parts are called _____ fruits.
- 1.10 Double fertilisation in plants produces a food source for the developing embryo called the...
[10×2=20]

QUESTION 2

Distinguish or explain the difference between the following:

- | | |
|---|-----|
| 2.1 Autotrophic and heterotrophic | (4) |
| 2.2 Asexual and sexual reproduction | (4) |
| 2.3 Phonetic approach and cladistics approach | (4) |
| 2.4 Light and electron microscope | (4) |

[16]

QUESTION 3

3.1 Use a diagram to illustrate the different phases of meiosis. Use boxes of information to describe what happens at each phase. (20)

3.2 Name the different types of meristems and their derivatives in plants. (10)
[30]

QUESTION 4

4.1 Give five reasons why plants are the most important organism in the world. (10)

4.2 What are mycorrhizae, and how are they beneficial to the plant? (5)

4.3 Describe the structure and function of five types of modified stems. (15)
[34]

TOTAL: 100 Marks

END OF ASSIGNMENT 02 (SEMESTER 2)