

Ministry of Higher Education and Scientific research



Department of Biology

College of Education

Salahaddin University-Erbil

Subject: Practical plant anatomy

2nd stage

Lecturer's name: Maqsuda Qadir Muhammad

Academic Year: 2024-2025

Course Book

1. Course name	Practical Plant Anatomy
2. Lecturer in charge	Maqsuda Qadir Muhammad
3. Department/ College	Biology Dept./ College of Education
4. Contact	e-mail: maqsuda.muhammad@su.edu.krd Tel: (07504964958)
5. Time (in hours) per week	12 hrs
6. Office hours	
7. Course code	
8. Teacher's academic profile	<p>I graduated from the collage of education, department of biology in 1999 and obtained BSc in biology. Been assigned as lab administrator in the same department in same department and collage. This included practical biology such as microbiology, parasitological and biotechnique lab. Then I started to study MSc in the field of plant physiology in 2001-2004 in Salahaddin University college of education department of biology.</p> <p>Then, I started to work in the same department as an assistant lecture since 2004. During this period I have taught plant anatomy, practical plant physiology and botany.</p>
9. Keywords	
10. Course overview:	
<p>The plant anatomy is the branch of botany concerned with the internal structure of plants. Plant anatomy is a division of the more general botanical discipline of plant morphology as it is understood in the broad sense—that is, the study of the microscopic structure of plant tissues and organs. In its narrow sense, plant morphology studies only the external forms of plants and their organs. Plant anatomy is closely related to plant physiology, the science of the vital processes which take place in plants. Plant anatomy, in turn, has given rise to the independent science of cytology, which is the study of the cell, a rapidly developing field that plays a great role in the understanding of vital processes in general and of the phenomena of heredity and mutability in particular.</p>	

The basic method used in plant anatomy, or the study of internal plant structure, is the preparation of thin slices which are studied microscopically. From this the science “derives its name (in Greek, anatomē means “dissection”). New research techniques are in use as well—for example, polymerization; ultraviolet, luminescence, and phase-contrast methods; electron microscopy; histochemical methods; and X-ray diffraction analysis. Anatomical research is carried out to answer questions regarding the origin of plants and to provide information about the effect of external conditions on various agricultural crops. Such research also helps to solve many problems in fields other than biology and agronomy, such as technology, the history of culture, criminology, and a number of branches of industry—food, furniture, pharmaceuticals, cellulose-paper production, and so forth. For example, plant anatomy offers a means of detecting the presence of impurities in flour through the use of microscopic study of starch grains; it can also be used to determine the species and condition of medicinal raw material.

11. Course objective:

- 1-To provide students with skills necessary to section and stain fresh plant material in preparation for study of plant anatomy.
- 2-To train students in the proper use of the compound light microscope and to give them experience in interpreting images that they see through the microscope in terms of how plant structure is related to function.
3. To recognize the organelles of the plant cells and what is the different between plant and animal cell.
- 4-. To recognize the types of tissue – Meristem and Permanent tissue
5. To recognize all about primary and secondary growth of stem and root.
6. To recognize how to differentiate between cells and tissue systems and how they are arranged internally by studying sectional view of stems, roots and leaves of dicot and monocot plant.
7. To learn how fertilization are happened in the plant.
8. To recognize the types of plants in the relation with water factor.

Finally, in the end of teaching year student should be familiar with the plant cell and how they organized to for a different tissue. And then student should be able to differentiate between primary and secondary growth of the root and stems in different types of plant.

12. Student's obligation

The role of students and their obligations throughout the academic year include:

- A. Quizzes and daily activities.
- B. Laboratory exercises exam.
- C. examination.
- D. Attendance
- E. Drawing note book

13. Forms of teaching

In this course different ways are use; this ways is characterized by simplicity, and distinct. The best important one is using power point presentations which give benefits tools for observation a statements, diagrams, and pictures. As well as white board and colour pencil. Some lectures need to present poster for further clearing. With practical part use plants ,samples of plant organs, sectioning , stain, prepare wet temporary slides.

14. Assessment scheme

No.	Exam (Evaluation)	Marks
	1) Quizzes and daily activities.	10/35
	2) Laboratory exercises exam.	5/35
	3) examination.	15/35
	4) Attendance	3/35
	5) Drawing note book	2/35

15. Student learning outcome:

1. Recognize the plant cell and cell wall components.
2. Recognize plant tissues and types of plant tissues.
3. Recognize internal structure of plant organs.
4. Recognize the differences between dicotyledones and monocotyledones root.
5. Recognize the differences between dicotyledones and monocotyledones stem.
6. Recognize the differences between dicotyledones and monocotyledones leaf.
7. Recognize secondary growth in dicotyledones stem and root.
8. Recognize plant structure in relation to environment.
9. Recognize the structure of the flowers, seed, fruits.

16. Course Reading List and References:**▪ Key references:**

1. Bowes, B. G. (2000) *A Color Atlas of Plant Structure*, Iowa State University Press, Ames, IA, 192 p., available at the URI Bookstore.
2. The Multiple Steps in Construction of the Cell Plate Following Mitosis (<http://www.plantphys.net/article.php?ch=1&id=21>)
3. Taiz, L, Zeiger, E (2002) *Plant Physiology*, 3rd edition, Chapter 14: Gene Expression and Signal Transduction, pp. 1-2, 5-11 (<http://www.plantphys.net/pdf/ch14.pdf>)
4. Nakajima, K, Benfey, PN (2002) Signaling in and out: control of cell division and differentiation in the shoot and root. *Plant Cell* 14:S265-S276 (http://www.plantcell.org/cgi/reprint/14/suppl_1/S265.pdf)
5. *Plant Tissue Systems: Dermal, Ground, and Vascular* (<http://www.plantphys.net/article.php?ch=1&id=19>)
6. Howell, SH (1998) *Molecular Genetics of Plant Development*, Chapter 6: Leaf development, pp. 136-157.
7. Glover, BJ (2000) Differentiation in plant epidermal cells. *J. Exp. Bot.* 51(344):497-505 (<http://jxb.oupjournals.org/cgi/reprint/51/344/497.pdf>)

8. Observing Roots below Ground (<http://www.plantphys.net/article.php?ch=t&id=44>)
9. Steeves, TA, Sussex, IM (1989) Patterns in Plant Developments, 2nd edition, Chapter 7: Organogenesis in the shoot: leaf origin and position, pp. 109-121.
10. Howell, SH (1998) Molecular Genetics of Plant Development, Chapter 6: Vascular development, pp. 312-125.
11. Flower Structure and the Angiosperm Life Cycle (<http://www.plantphys.net/article.php?ch=t&id=18>)
12. Taiz, L, Zeiger, E (2002) Plant Physiology, 3rd edition, Chapter 24: The control and flowering, pp. 560-565.
13. Barclay, Gregor Fraser (January 2015) Anatomy and Morphology of Seed Plants. In: eLS. John Wiley & Sons, Ltd: Chichester.
1. DOI: 10.1002/9780470015902.a0002068.pub2

17. The Topics:

Lab/1

plant cell wall

- Types of cell wall (Meddle lamella, Primary cell wall and Secondary cell wall).
- Formation of cell walls.
- Pits
- Types of pits
- Plasmodesmata

Lab/2

-Protoplast

- living component
- Plasma membrane
- Cytoplasm
- Cytoskeleton
- Nucleus
- Plastid (types and functions of each one).
- (Mitochondria ,ribosome ,Golgi apparatus, Endoplasmic reticulum)

Lab/3

- Protoplast

- Non-living components
- Vacuole(parts+functions)
- Crystals(function +types)
- Starch grain(function +types)
- Aleurone grains(parts+functions)

Lab/4

-Plant tissues

<p>1-Meristematic tissues</p> <ul style="list-style-type: none">-types of meristematic tissues.-Root apex regions.-Shoot apex theories.
<p>Lab/5</p> <p>-Plant tissues</p> <p>2-Permanent tissues</p> <p>A-Dermal tissues</p> <ul style="list-style-type: none">-Epidermal tissues-Types of epidermal layers- Types of epidermal cells.-Functions of Epidermal tissues.- Periderm
<p>Lab/6</p> <ul style="list-style-type: none">-Stoma.-Functions of stoma.-Types of stoma-Types of stomatal apparatus
<p>Lab/7-Epidermal Hairs</p> <ul style="list-style-type: none">-Functions of Epidermal hairs.-Types of epidermal hairs.
<p>Lab/8</p> <p>2- Permanent tissues</p> <p>B- Ground tissues</p> <p>1- Parenchyma tissues</p> <ul style="list-style-type: none">-Characters-Origin-Shapes-Types-Functions
<p>Lab/9</p> <p>2- Permanent tissues</p> <p>B- Ground tissues</p> <p>2- Collenchyma tissues</p>

<ul style="list-style-type: none">-Characters-Origin-Types-Functions
<p>Lab/10</p> <p>2- Permanent tissues</p> <p>B- Ground tissues</p> <p>3- Sclerenchyma tissues</p> <ul style="list-style-type: none">-Characters-Origin-Functions-Types <p>a –Fibers</p> <ul style="list-style-type: none">-Characters-Types of fibers
<p>Lab/11</p> <p>2- Permanent tissues</p> <p>B- Ground tissues</p> <p>1- Sclerenchyma tissues</p> <p>b -Scleride</p> <ul style="list-style-type: none">-Characters-Types
<p>Lab/12</p> <ul style="list-style-type: none">- Permanent tissues <p>C-Conducting tissues</p> <p>1-Xylem tissues</p> <ul style="list-style-type: none">- Parts of xylem tissue.-Shapes-Functions-Types of vessels-Origin- Comparison between Primary xylem& Secondary xylem.
<p>Lab/13</p> <ul style="list-style-type: none">c-Conducting tissues2-Phloem tissues-Parts of phloem tissue.

<ul style="list-style-type: none">-Shapes-Origin-Functions.- Comparison between Primary phloem& Secondary phloem.
Lab/14 D-Secretary Tissues <ul style="list-style-type: none">-Types of internal Secretary tissues- Types of external Secretary tissues
Lab/15 Internal structure of Root <ul style="list-style-type: none">-Root anatomy-Functions of root.- Root regions- Comparison between monocotyledon root & dicotyledon root.
Lab/16 Internal structure of Stem <ul style="list-style-type: none">-Stem anatomy-Functions of stem-Types of vascular bundles-Comparison between monocotyledon stem & dicotyledon stem
Lab/17 -Internal structure of leaf -Functions of leaf -Leaf anatomy -Comparison between monocotyledon leaf & dicotyledon leaf
Lab/18 -Internal structure of Flower -Functions of flower -Flower anatomy. - Formation of pollen grains. - Formation of egg. - Fertilization.
Lab/19 -Internal structure of fruit -Functions of fruits.

- Fruits anatomy.

Lab/20

Internal structure of Seeds

- Functions of seeds.
- Seeds anatomy.

Lab/21

- Secondary growth of Root
- Comparison the secondary growth of root in monocotyledon & dicotyledon .

Lab/22

- Secondary growth of stem
- Comparison the secondary growth of stem in monocotyledon & dicotyledon

Lab/23

- Abnormal growth in plants
- Abnormal growth in monocotyledon plants.
- Abnormal growth in monocotyledon plants.

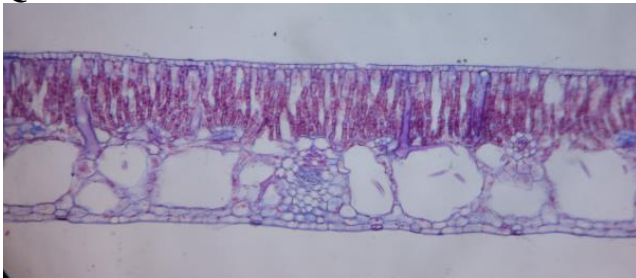
Lab/24

Environment and internal structure of plant

- Xerophyte plants.
- Mesophyte plants.
- Hydrophyte plants.

Examinations:

Q/In this slide writes the:

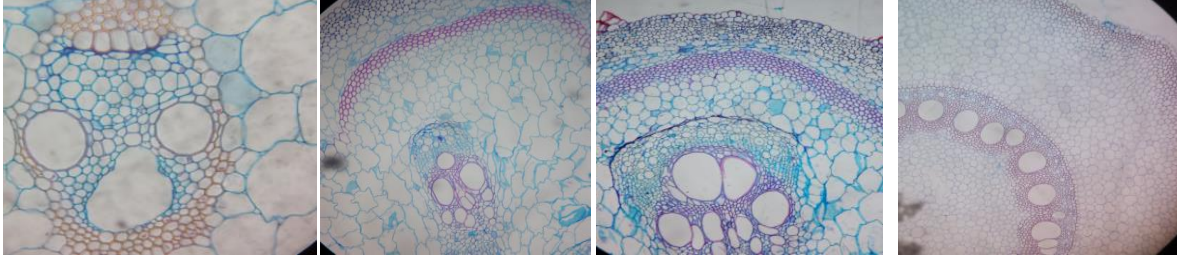


- 1- Scientific name of the plant.
- 2- Type of the plant.
- 3- Type of the Stoma.
- 4- Types of Parenchyma cells.
- 5- Types of sclerenchyma cells.

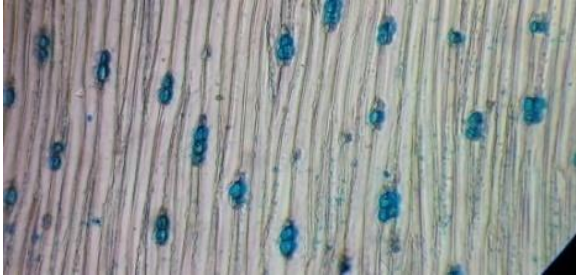
Q/where these structures are found (write the scientific name of the plant):

- 1- Canal pit.
- 2- Lysiginous cavity.
- 3- Anomocytic.
- 4- Trichoscleride.
- 5- Haydathodes.

Q/write the type of vascular bundles in these plants:



Q/A- Identify this slide & write its scientific name.



B- Write the parts of the Nucleus.

Q/Write the:

- 1- Type of crystal in *Pyrus communis*. fruit
- 2- Type of epidermal layer in *Nerium olender*.leaf
- 3- Type of plastid in *lycopersicum sp.* fruit
- 4- Type of epidermal hair in *Olea sp.* leaf

20. Extra notes:

21. Peer review:

