



رؤية
VISION
2030
المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA



Kingdom of Saudi Arabia
Ministry of Education
Jazan University
College of Science
Biology Department



دليل المختبرات

BIOLOGY

Labratories Guide

2022- 2023

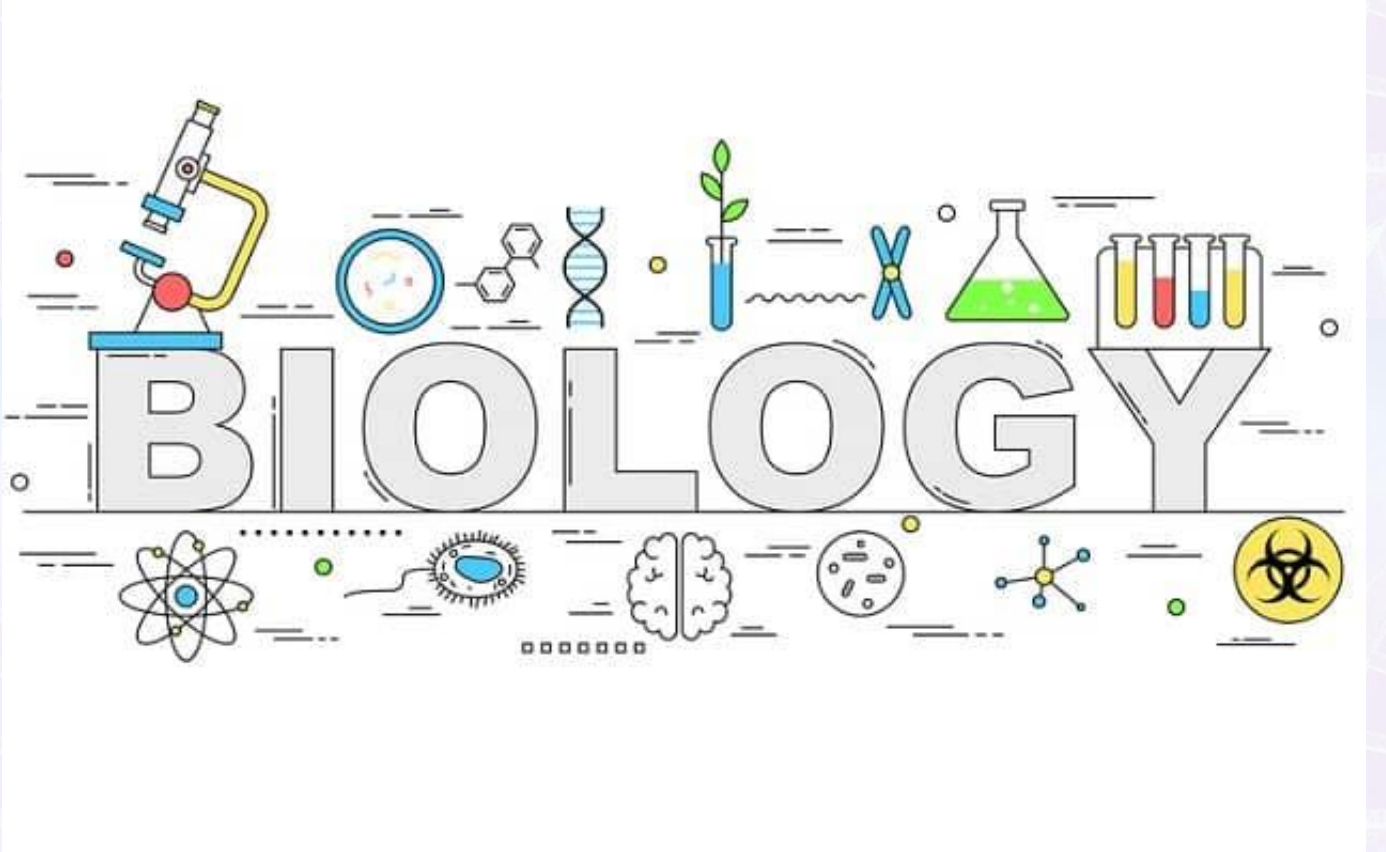
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مقدمة

تم بحمد الله إعداد هذا الدليل على قاعدة بيانات مبسطة لمختبرات قسم الأحياء ومختلف الأجهزة العلمية بها والتي تخدم كافة المقررات التعليمية والأنشطة البحثية بالقسم. ويأتي إعداد هذا الدليل وجمع كل الأجهزة في كتيب واحد ليكون دليلاً للطلاب والباحث ومرشداً لكل العاملين بالمختبر ليساهم في تطوير وتيسير الجلسات العملية وأبحاث التخرج وهي أحد أهم محاور العملية التعليمية بالقسم. وختاماً تتقدم لجنة المعامل والتجهيزات بالقسم بخالص التقدير لكل من ساهم في إعداد هذا الدليل سائلين المولى عز وجل أن يكون نافعاً ومفيداً لأبنائنا الطلاب والطالبات والعاملين بمختبرات القسم.



نبذة عن قسم الأحياء

يعد قسم الأحياء بشطري الطلاب والطالبات من أهم أقسام كلية العلوم بجامعة جازان منذ أن تأسس مع نشأتها الأولى عام 1426 هـ الموافق 2006م. يقدم قسم الأحياء للطلاب المهتمين تعليماً ليبرالياً في العلوم البيولوجية. ويوفر للخريجين خلفية واسعة ضرورية في سوق العمل اليوم وإعدادهم للدراسات العليا والمدارس المهنية. الطلاب الحاصلين على درجة علمية في علم الأحياء يؤمنون مناصب في المجالات المتنامية في الصناعة والبيئة والطب والأوساط الأكاديمية. خلقت التطورات الأخيرة في علم الأحياء صناعات جديدة مهمة في الهندسة الوراثية والطب الحيوي والتكنولوجيا الحيوية والصيدلة. الطلاب الذين لديهم طموحات تتجاوز مستوى البكالوريوس التسجيل في كليات الدراسات العليا والمدارس المهنية في جميع أنحاء العالم مثل الطب وطب الأسنان والطب البيطري. يقدم قسم الأحياء درجة البكالوريوس في العلوم في علم الأحياء ودرجة الماجستير في أحد التخصصين الرئيسيين في علم الأحياء. علم الحيوان وعلم النبات وعلم الأحياء الدقيقة. توفر البرامج العديد من الفرص للمهنيين في التدريس والصحة ومراكز البحوث الزراعية والصناعية والبيئية. واسترشد القسم في تصميم المناهج الدراسية بمتطلبات الاعتماد الأكاديمي، ومعايير الهيئة الوطنية للتقويم والاعتماد الأكاديمي، ووفقاً للإطار الوطني للمؤهلات للتعليم العالي في المملكة العربية السعودية. مع إمكانية التحسين المستمر للمناهج والخطط الدراسية وذلك للاستجابة للتغيرات المتوقعة التي قد تطرأ على العالم.

رؤية ورسالة وأهداف القسم

الرؤية

التميز والريادة والابتكار في التعليم والبحث العلمي وخدمة المجتمع محلياً وإقليمياً.

الرسالة

تقديم برامج أكاديمية متميزة لتأهيل الطلاب، وأبحاث علمية مبتكرة للمساهمة في متطلبات التنمية وخدمة المجتمع.

أهداف القسم

- إتاحة تعليم شامل ومثالي قائم على المرافق والخدمات بالقسم
- تطوير وتحسين الاستفادة من بنية تقنية المعلومات بالقسم
- التحقق من انجاز الخطط السنوية بالقسم
- تطوير قدرات ومهارات الموارد البشرية بالقسم
- إتاحة برامج أكاديمية ذات جودة عالية قائمة على استراتيجيات تعليمية حديثة في مختلف مجالات علوم الأحياء
- زيادة دعم وتطوير البحث العلمي والابتكار في مجالات البرنامج المتعددة
- تفعيل وتعزيز الشراكات التعليمية والتدريبية بالقسم
- تطوير وموائمة مخرجات تعلم البرنامج وتنمية مهارات الطلاب وأعضاء هيئة التدريس
- تحسين وتطوير كفاءة خريجي القسم
- تطوير دور البرنامج في خدمة المجتمع

كلمة سعادة رئيس القسم



رئيس القسم

د. عبدالله بن يحيى مشرقي

إنه لمن دواعي سروري ان اكتب هذه الكلمة عن قسم الأحياء بجامعة جازان الذي يسهم في خدمة وطننا ومجتمعنا بصفة عامة وخدمة جامعة جازان وكلية العلوم بصفة خاصة.

تأسس قسم الأحياء مع إنشاء كلية العلوم بجامعة جازان بهدف تقديم برنامج واحد (حاليًا) متخصص في علم الأحياء العام (بكالوريوس العلوم في الأحياء، بكالوريوس العلوم في علم الأحياء)، على أمل أن تقوم الفروع الأخرى ستفتتح في المستقبل ببرنامج الدراسات العليا بإذن الله وتوفيقه. يضم القسم مجموعة من أعضاء هيئة التدريس المتميزين في مختلف فروع هذا العلم، للعمل على تدريس مقررات خطة متوازنة تتضمن مقررات تمنح الطالب معرفة تقدمية ومتكاملة في أساسيات وفروع علم الأحياء. حتى يتخرج الطالب بفصول أساسية ونظرية وعملية، في هذا العلم تساعد في الخوض في سوق العمل في المجالات ذات الصلة، أو دراساته العليا في أي من فروعه المختلفة.

كلمة مساعدة رئيس القسم

إن الله فالق الحب والنوى يخرج الحي من الميت ومخرج الميت من الحي. يدرس طالب قسم الأحياء كيفية ظهور هذه الكائنات الحية وتطورها والعلاقات بينها وبين بيئتها. بالإضافة إلى كونه علمًا وثيق الصلة بالعلوم الأخرى. تأسس قسم الأحياء مع بداية كلية العلوم عام 1426 هـ، وافتتح القسم مع بداية الفصل الدراسي الأول من العام الدراسي 1429/1430 هـ. تتمثل مهمة القسم في تطوير مهارات الطلاب وتنميتها، وإيقاظ طاقاتهم الكامنة، وتعزيز مشاركتهم الأكاديمية والثقافية والاجتماعية، وتأهيلهم لسوق العمل من خلال تبني فلسفة الجودة وتوفير بيئة تقدر الجهود وتكافئ النجاح في على ضوء القيم الإسلامية النبيلة وبناء شراكات بحثية عالمية لخدمة المجتمع وبرامج التنمية الوطنية. وتحقيقاً لرسالة القسم في تقديم تعليم وبحث علمي عالي الجودة مع الابتكار في مجالات علوم الحياة للمساهمة في تنمية مجتمع فعال وحيوي، وتماشياً مع السياسة العامة لكلية العلوم للتميز فإن قسم الأحياء يسعى لاستمرارية تطوير خطته الدراسية التي تحقق أهداف الكلية عامة وأهداف القسم بصفة خاصة وتهيئة بيئة أكاديمية بإمكانات أساسية وسير نحو التميز والقيادة المطلوبة لكل من الإنتاج البحثي والمهنية الناجحة التي تخدم تنمية المجتمع.

د. يسرى أحمد مظفر

مساعدة رئيس القسم



مختبرات القسم

يضم قسم الأحياء بكلية العلوم 22 مختبر لخدمة الطلاب والطالبات بمرحلة البكالوريوس والماجستير في تخصصات مختلفة علم البكتيريا، التقنية الحيوية، علم المناعة، الطفيليات، الفيروسات، أساسيات علم البيئة، سلوك الحيوان، علم الأجنة، علم الأحياء البحرية، علم البيئة النباتية، مورفولوجيا وتشريح النبات، هرمونات النبات، فسيولوجيا النبات، بيئة وسلوك الحيوان.. الخ.

تدرس المقررات موزعة على مختبرات القسم، شطر الطلاب (11) مختبر وعدد (11) مختبر بشطر الطالبات كما هو موضح بالجدول التالي:

■ مختبرات قسم الأحياء شطر الطلاب

| م | اسم المختبر | رقم المختبر | موقع المختبر |
|----|---|-------------|-------------------------------|
| 1 | مختبر علم الحيوان (1) Zoology Lab (1) | G705 | كلية العلوم |
| 2 | مختبر علم الحيوان (2) Zoology Lab (2) | G707 | كلية العلوم |
| 3 | مختبر علم الحيوان (3) Zoology Lab (3) | G706 | كلية العلوم |
| 4 | مختبر علم النبات (1) Botany Lab (1) | G601 | كلية العلوم |
| 5 | مختبر علم النبات (2) Botany Lab (2) | G611 | كلية العلوم |
| 6 | مختبر الأحياء الدقيقة (1) Microbiology Lab (1) | G608 | كلية العلوم |
| 7 | مختبر الأحياء الدقيقة (2) Microbiology Lab (2) | G604 | كلية العلوم |
| 8 | مختبر التقنية الحيوية Biotechnology Lab | G608 | كلية العلوم |
| 9 | المعشبة Herbarium | G708 | كلية العلوم |
| 10 | مختبر الأحياء العامة (2) General Biology lab (2) | G609 | كلية الآداب والعلوم الإنسانية |
| 11 | مختبر الأحياء العامة (1) General Biology lab (1) | G708 | كلية الآداب والعلوم الإنسانية |

■ مختبرات قسم الأحياء شطر الطالبات – مجمع الكليات – محلية

| م | اسم المختبر | رقم المختبر | موقع المختبر |
|----|---|-------------|---------------------------------------|
| 1 | مختبر علم الأحياء الدقيقة (1) Microbiology Lab (1) | DF-01 | كلية العلوم – مبنى D الطابق الأول |
| 2 | مختبر علم الأحياء الدقيقة (2) Microbiology Lab (2) | DF-02 | كلية العلوم – مبنى D الطابق الأول |
| 3 | مختبر علم الأحياء الدقيقة (3) Microbiology Lab (3) | DF-03 | كلية العلوم – مبنى D الطابق الأول |
| 4 | مختبر علم النبات (1) Botany Lab (1) | DF-04 | كلية العلوم – مبنى D الطابق الأول |
| 5 | مختبر علم النبات (2) Botany Lab (2) | DF-15 | كلية العلوم – مبنى D الطابق الأول |
| 6 | مختبر الأحياء العامة (1) General Biology Lab (1) | DF-16 | كلية العلوم – مبنى D الطابق الأول |
| 7 | مختبر الأحياء العامة (2) General Biology Lab (2) | DS-01 | كلية العلوم – مبنى D الطابق الثاني |
| 8 | مختبر الدراسات العليا Postgraduate Lab | DS-12 | كلية العلوم – مبنى D الطابق الثاني |
| 9 | مختبر علم الحيوان (1) Zoology Lab (1) | DS-14 | كلية العلوم – مبنى D الطابق الثاني |
| 10 | مختبر علم الحيوان (2) Zoology Lab (2) | DS-15 | كلية العلوم – مبنى D الطابق الثاني |
| 11 | معمل الأحياء العامة (3) General Biology Lab (3) | DS-17 | كلية العلوم – مبنى D الطابق الثاني |

■ المقررات العملية بقسم الأحياء

| م | رقم ورمز المقرر | اسم المقرر | عدد الساعات الدراسية | | عدد الوحدات المعتمدة |
|----|-----------------|-----------------------------|----------------------|--------|----------------------|
| | | | (نظري) | (عملي) | |
| 1 | 101-حيا-4 | أحياء عامة | 3 | 2 | 4 |
| 2 | 211-حيا-3 | علم الخلية | 2 | 2 | 3 |
| 3 | 222-حيا-2 | وراثة عامة | 1 | 2 | 2 |
| 4 | 301-حيا-2 | أساسيات علم البيئة | 1 | 2 | 2 |
| 5 | 311-حيا-2 | تحضيرات مجهرية | 1 | 2 | 2 |
| 6 | 402-حيا-2 | التنوع الحيوي في المملكة | 1 | 2 | 2 |
| 7 | 411-حيا-2 | بيولوجيا جزئية | 1 | 2 | 2 |
| 8 | 412-حيا-2 | تقنية حيوية | 1 | 2 | 2 |
| 9 | 491-حيا-2 | بحث تخرج | 1 | 2 | 2 |
| 10 | 251-حين-3 | لافقاريات | 2 | 2 | 3 |
| 11 | 252-حين-2 | علم الأنسجة | 1 | 2 | 2 |
| 12 | 254-حين-3 | حبليات | 2 | 2 | 3 |
| 13 | 351-حين-3 | فسيولوجيا حيوان | 2 | 2 | 3 |
| 14 | 352-حين-2 | علم الطفيليات | 1 | 2 | 2 |
| 15 | 353-حين-3 | أحياء بحرية | 2 | 2 | 3 |
| 16 | 354-حين-2 | علم المناعة والأمصال | 1 | 2 | 2 |
| 17 | 356-حين-3 | علم الحشرات العام | 2 | 2 | 3 |
| 18 | 451-حين-2 | علم الغدد الصماء | 1 | 2 | 2 |
| 19 | 452-حين-2 | علم الأجنة | 1 | 2 | 2 |
| 20 | 454-حين-2 | بيئة وسلوك الحيوان | 1 | 2 | 2 |
| 21 | 456-حين-3 | حشرات طبية واقتصادية | 2 | 2 | 3 |
| 22 | 241-نبت-3 | مورفولوجيا وتشريح نبات | 2 | 2 | 3 |
| 23 | 242-نبت-2 | أرشيونيات | 1 | 2 | 2 |
| 24 | 341-نبت-2 | علاقة النبات بالماء والتربة | 1 | 2 | 2 |
| 25 | 342-نبت-2 | تصنيف النباتات الزهرية | 1 | 2 | 2 |
| 26 | 344-نبت-2 | هرمونات نباتية | 1 | 2 | 2 |
| 27 | 441-نبت-3 | فسيولوجيا نبات | 2 | 2 | 3 |
| 28 | 442-نبت-2 | نبات اقتصادي | 1 | 2 | 2 |
| 29 | 443-نبت-2 | علم البيئة النباتية | 1 | 2 | 2 |

| م | رقم ورمز المقرر | اسم المقرر | عدد الساعات الدراسية | | عدد الوحدات المعتمدة |
|----|-----------------|-------------------------|----------------------|--------|-------------------------|
| | | | (نظري) | (عملي) | |
| 30 | 231حدق-2 | علم البكتريا | 1 | 2 | 2 |
| 31 | 232حدق-2 | علم الفيروسات | 1 | 2 | 2 |
| 32 | 331حدق-2 | الطحالب | 1 | 2 | 2 |
| 33 | 333حدق-3 | فطريات وامراض نبات | 2 | 2 | 3 |
| 34 | 334حدق-3 | فسيولوجيا أحياء دقيقة | 2 | 2 | 3 |
| 35 | 431حدق-2 | ميكروبيولوجيا صناعية | 1 | 2 | 2 |
| 36 | 432حدق-2 | ميكروبيولوجيا البيئة | 1 | 2 | 2 |
| 37 | 433حدق-2 | ميكروبيولوجيا طبية | 1 | 2 | 3 |
| 38 | 105حيا-4 | الأحياء للتخصصات الصحية | 3 | 2 | 4 |



التجارب العملية بقسم الأحياء

Experiments in Biology Labs

General Biology

This lab aims to: Teach students the basic information of Biology such as Prokaryotic, Eukaryotic cells, animal and plant cells, and types of tissues. Provide students with the skill of anatomy of experimental animals and identify the systems and their organs.

| Practical Lessons at the Laboratory of General Biology (BIOL101) | |
|--|--|
| 1 | Introduction |
| 2 | How to Prepare a Wet Mount Microscope Slide Detection of Carbohydrates (activity) by Iodine Test for Starch Detection of proteins by aleurone |
| 3 | Prokaryotic cells, Eukaryotic cells, animal cell, plant cell, human blood film and Toad blood film. |
| 4 | Taxonomy: Amoeba, Trypanosoma, Paramecium, Ascaris, Allolobophora (Earth worm), Echinodermata, Astropecten (Star fish), Amphibians (frog), Nostoc, Bacillus bacteria, Spirillum bacteria, Coccus bacteria, Penicillium, Spirogyra, Euglena |
| 5 | Animal Tissues: Epithelial tissues, Simple-Epithelial tissues, Stratified-Epithelial tissues, Connective tissues muscular tissues, nervous tissues, |
| 6 | plant tissues. T. S. in apical stem, Monocot stem, Dicot stem, Root Section, leaves, parenchyma, collenchyma and sclerenchyma |
| 7 | Anatomy: Dissection of digestive system and Excretory system of mice |
| 8 | Reproduction: Section of rat testis and Section of cat ovary |
| 9 | Excretion: T.S. of skin of human, T.S. of kidney of rabbit, Stomata, Cell Division: Binary fission, Mitosis division and Meiosis division |

Cell Biology

This lab aims to:

To give practical experience in understanding different cell structures, its organelles and cell division.

The experiments include are:

| Practical Lessons at the Laboratory of Cell Biology (BIOL 211) | |
|--|---|
| 1 | Introduction |
| 2 | Structure of Microscope Types of Microscopes Scanning Electron Microscope (SEM) Transmission Electron Microscope (TEM) |
| 3 | Structure of Animal cell Structure and function of the Nucleus |
| 4 | Structure and types of Endoplasmic Reticulum |
| 5 | Detection of X-rays using ionization chamber |
| 6 | Transport Vesicles Mitochondria |
| 7 | Cytoskeleton Plastids |
| 8 | Energy gap of Si using PN junction |
| 9 | Central Vacuoles Cell Wall |
| 10 | Structure of Plant and Animal Cells Mitosis and Meiosis |

General Genetics

This laboratory is a basic science. The student will be studying the main concepts of Genetics such as - Structure and types of chromosomes. The Differences between Mitosis and Meiosis. applied Mendel laws. how can make blood grouping using ABO system.

The experiments in the Lab include:

| Practical Lessons at the Laboratory of General Genetics (BIOL222) | |
|---|---|
| 1 | General introduction- Definitions- Structure and types of chromosomes |
| 2 | Mitotic and Meiotic Division |
| 3 | Karyotype. |
| 4 | Chromosomal aberrations. |
| 5 | Preparation of mitotic (metaphase) chromosomes from bone marrow or Spleen of albino mice. |
| 6 | Mendelian Genetics (Mendel first law) |
| 7 | Mendel Second law |
| 8 | Non-Mendelian Genetics |
| 9 | Blood groups |
| 10 | Barr Bodies |

Fundamental of Ecology

In this lab students will be able to learn the fundamentals in ecology with the goal to perceive the environment beyond its physical and chemical characteristics.

The experiments in the Lab include:

| Practical Lessons at the Laboratory of Fundamental of Ecology (BIOL 301) | |
|--|--------------------------------------|
| 1 | Introduction to the practical course |
| 2 | Temperature |
| 3 | Relative humidity |
| 4 | Rainfall rate |
| 5 | Light Intensity |
| 6 | The winds |
| 7 | Atmospheric pressure |
| 8 | The soil (1) |
| 9 | The soil (2) |

Specimen Techniques

This lab is designed to reinforce student skills of samples fixation process, microtome and paraffin sections, frozen sections and staining techniques, types of microscopically preparations, introductory histochemistry, and demonstration techniques. preparation and staining of plant sections (Roots, stems and leaves). Preparation, processing and staining of some organelles and contents of the cell. Preparation and staining of the different stages and chromosomes in the mitosis and meiosis of the cell. Preparation and staining bacterial smears. preparation and staining blood film.

The experiments include are:

| Practical Lessons at the Laboratory of Specimen Techniques (BIOL311) | |
|---|---|
| 1 | Introduction to the practical course -Methods of preparing microscopic specimens -light compound microscope components - Preparing Animal and Plant Cells Slides |
| 2 | Whole Mount Preparation: preparation a whole wet mount specimen. ex.: Fungi |
| 3 | Direct Method Specimen: from water sample |
| 4 | Preparation and study of mitosis in Onion root tips (Squashing Method) |
| 5 | Preparation of blood sample using Smears Method |
| 6 | How to Prepare Stomata Slide for Microscopic Study of Stomata? |
| 7 | Steps of Specimen Preparation for microscopic examination using Paraffin Technique (1) |
| 8 | Steps of Specimen Preparation for microscopic examination using Paraffin Technique (2) |
| 9 | Steps of Specimen Preparation for microscopic examination using Paraffin Technique (3) |

Biodiversity in the Kingdom of Saudi Arabia

This course is designed to provide students with the following concepts: To study the biodiversity of the kingdom and its importance. Getting to know the different environments in the Kingdom. Identifying animal species (invertebrates and vertebrates) in the Kingdom, their distribution and abundance, and their most important characteristics. To Study of the natural vegetation of different habitats of Saudi Arabia.

The experiments include are:

| Practical Lessons at the Laboratory of Biodiversity in the K. S. A. (BIOL 402) | |
|---|---|
| 1 | Introduction to the practical course |
| 2 | Collecting, classifying and naming coastal plant samples and study the environment in which it grows in terms of living factors non-living and their interactions |
| 3 | Collecting botanical samples from sabakhas and saline areas classifying and naming them, and studying the environment in which they grow in terms of living and non-living factors and their interactions |
| 4 | Soil salinity assessment, rain temperature climatic diagram curve. Collecting botanical samples from the rocky hills of Tihama. It is the areas of the mountainous highlands, classified and named and study the environment in which it grows in terms of living factors non-living and their interactions. |
| 5 | Collecting and counting animal samples from different environments Coastal and terrestrial and classified as an example of invertebrate animals (Crustaceans - Arachnids - with a detailed study of some types of scorpions - Centipede |
| 6 | Fish: classification and types, Chondrichthyes, cartilaginous fishes general characters & examples. -Class Osteichthyes, general characters – examples (Fresh water fish & example saltwater fish & examples). |
| 7 | Arachnid animals: -Amphibians: general characteristics - classification and examples. -Footless order Apoda -Order Urodela caudate - Anura (tailless) -Amphibians in Saudi Arabia importance: Collecting few samples for the study. - Brachycephalic animals Reptiles: their general characteristics- classified. Examples for her. Dabbling(lizard) – Skinkor (skink) - Alwarl - Chameleons - geckos - snakes - serpents – snakes marine - endangered species |
| 8 | Aves (General characters, ecology, distribution. examples) |
| 9 | Mammals (General characters, ecology, distribution. examples) |

Molecular Biology

Help the students to the correct handling of bacterial recombinants, antibiotic sensitivity testing, insertional inactivation, plasmid DNA isolation, restriction endonuclease digestion, agarose gel electrophoresis.

The experiments include are:

| Practical Lessons at the Laboratory of Molecular Biology (BIOL 411) | |
|---|---|
| 1 | Introduction |
| 2 | Biosafety at Laboratories |
| 3 | Types of cultural Media Isolation of plasmid DNA from Bacteria |
| 4 | Isolation of DNA from bacteriophages DNA Gel Electrophoresis |
| 5 | Restriction enzymes Ligation of DNA |
| 6 | Back scattering of gamma rays |
| 7 | Polymerase Chain Reaction (PCR) |
| 8 | Bacterial transformation |
| 9 | Protein Electrophoresis (SDS-PAGE) |
| 10 | Molecular Cloning |

Biotechnology

This course is designed to reinforce the techniques for isolating genes and the subsequent engineering of these genes are discussed with an emphasis on the way engineered genes may be used to create transgenic, microbes, animals and plants or to produce recombinant proteins in cell factories.

The experiments include:

| Practical Lessons at the Laboratory of Biotechnology (BIOL 412) | |
|---|--|
| 1 | Introduction |
| 2 | Safety requirements in laboratories Classification of laboratories according to biosafety levels |
| 3 | Types of food media and plasmids |
| 4 | Role of IPTG in the differential media |
| 5 | DNA electrophoresis |
| 6 | Marker and how to recover DNA from a gel |
| 7 | Plasmid isolation from bacteria |
| 8 | The process of transferring the plasmid into bacteria (transformation) and evaluating the transfer process |
| 9 | Southern blotting & Immunological detection of hybrid products |

Invertebrate

This is an experimental class dedicated to introducing classification of higher and lower invertebrates, life cycle, internal and external body structures and functions.

The experiments include:

| Practical Lessons at the Laboratory of Invertebrate (ZOOL 251) | |
|--|---|
| 1 | Introduction |
| 2 | Introducing species for Subkingdom: Protozoa (Subphylum: Sarcomastigophora, Ciliata). Phylum: Apicomplexa, Microsporidae, and Myxozoa |
| 3 | Introducing species for Subkingdom: Parazoa (Leucosolenia and Sicosolenia). Spongin Fibron |
| 4 | Introducing species for Subkingdom: Parazoa (Phylum: Cnidaria, Class: Hydrozoa, Scyphozoa, Anthozoa) |
| 5 | Introducing species for Phylum: Platyhelminthes (Class: Turbellaria, Theratoda) and |
| 6 | Introducing species for Phylum: Nematoda (Class: Oligochaeta and Hirudinea) |
| 7 | Introducing species for Phylum: Arthropoda |
| 8 | Introducing species for Phylum: Arthropoda |
| 9 | Introducing species for Phylum: Echinodermata |

Histology

Principles of Histology Lab focuses on studying different types of animal tissues, to gain knowledge and experience in microscopic studies of the histology of blood vessels, tissue types and organs. The course is focused on the description of animal tissue structure within the main tissue type categories, description of the structure of animal organs, interpretation of the relationship between the structure and associated function of tissues and organs.

| Practical Lessons at the Laboratory of Histology (ZOOL 252) | |
|---|--|
| 1 | Introduction |
| 2 | Microscopic slides showing different types of epithelial tissues; simple and compound squamous, columnar, cuboidal, ciliated columnar, ciliated cuboidal, pseudostratified and transitional epithelium |
| 3 | Microscopic slides describing different types of connective tissues, areolar, white fibrous, elastic, reticular, adipose, plasma cells granular and agranular leukocytes, macrophages. |
| 4 | Microscopic slides describing different cartilaginous tissues, bones, striated, smooth and cardiac muscular tissues. |
| 5 | Microscopic slides describing different nervous tissues and sensory organs |
| 6 | Microscopic slides describing different tissues of circulatory system and lymphatic vessels. |
| 7 | Microscopic slides describing tissues of the different organs of the digestive system, liver, Pancreas and circulatory system organs. |
| 8 | Microscopic slides describing tissues of the different organs of the excretory system and the tissues of the different endocrine glands |
| 9 | Microscopic slides describing tissues of the male genital system, testes vas deferens, seminal vesicle, sperm ducts |
| 10 | Microscopic slides describing tissues of the female genital system, ovary, oviduct and uterus |

Chordates

This course is designed to provide students with the following concepts: To classify Phylum Chordata and its different Subclasses. To reorganize of the anatomy of the body plan in vertebrates, at the level of organs and systems. To identify of the morphological and anatomical structure for the major groups of vertebrates from an evolutionary point of view.

The experiments include:

| Practical Lessons at the Laboratory of Chordates (ZOOL 254) | |
|---|--|
| 1 | Introduction of phylum Chordata, Characteristics of chordates. Amphioxus the whole animal, T.S. in fore, hind pharyngeal region, trunk region and tail region |
| 2 | Balanoglossus, General characters, taxonomy and composition Ascidia, General characters, taxonomy and composition. Larva and its development to adult |
| 3 | Petromyzon, General characters, taxonomy and composition. the whole animal, T.S. in pharyngeal region, trunk region and tail region |
| 4 | Dogfish, General characters, taxonomy and composition. difference between male and female, anatomy of heart and circulation, respiratory system, placoid scales |
| 5 | Tilapia, General characters, taxonomy and composition. difference between male and female, anatomy of heart and circulation, respiratory system, cycloid scales |
| 6 | Toad, General characters, taxonomy and composition. life cycle difference between male and female, anatomy of heart and circulation, respiratory urinogenital and digestive systems. |
| 7 | <i>Chalcides ocellatus</i> General characteristics, classification of reptilian orders, General characteristics, digestive, circulatory, respiratory, urinogenital, and nervous systems of Scincus |
| 8 | <i>Columba livia domestica</i> , General characteristics, classification. Skeletal, digestive, circulatory, respiratory, excretory, genital, and nervous systems of pigeon. |
| 9 | <i>Oryctolagus cuniculus</i> , general characteristics, classification, external form, skeletal, digestive, circulatory, excretory, genital, and nervous systems of rabbit |

Animal Physiology

This course deals with providing the student with the skill of doing some important tests such as counting white and red blood cells and platelets, determining hemoglobin concentration and measuring some physiological phenomena.

The experiments include:

| Practical Lessons at the Laboratory of Animal Physiology (ZOOL351) | |
|--|---|
| 1 | Blood component |
| 2 | RBCs Count Using Hemocytometer |
| 3 | WBCs Count Using Hemocytometer |
| 4 | Estimation of Haemoglobin by Sahli's Method |
| 5 | Haematocrit determination |
| 6 | Human Blood Group |
| 7 | Study of the osmotic property of erythrocytes |
| 8 | Blood Pressure |
| 9 | Determination of blood sugar |

Parasitology

The lab will focus on drawing of parasites species and distinguish and compare different species under the microscope. In addition, learn taxonomy of specimens.

The experiments in the Lab include:

| Practical Lessons at the Laboratory of Parasitology (ZOOL 352) | |
|--|---|
| 1 | Phylum Amoebozoa, Class: Archamoebae (<i>Entamoeba histolytica</i>), (<i>Entamoeba coli</i>), Class: Kinetoplastida (<i>Trypanosoma sp.</i>) three types: <i>Trypanosoma gambiense</i> , <i>T. rhodsiense</i> , <i>T. cruzi</i> |
| 2 | Phylum Euglenozoa, Class: Kinetoplastea (<i>Leishmania</i>), Phylum Metamonada, Order: Diplomonadida (<i>Giardia lamblia</i>), Order: Trichomonadida (<i>Trichomonas tenax</i>), (<i>Trichomonas vaginalis</i>) |
| 3 | Phylum Ciliophora, Class: Litostomatea (<i>Balantidium coli</i>), Phylum Apicomplexa, Class: Aconoidasida (<i>Plasmodium sp.</i>), (<i>Plasmodium falciparum</i>), (<i>Plasmodium vivax</i>) (<i>Eimeria</i>) (<i>Cystoisospora belli</i>) |
| 4 | Phylum Apicomplexa, Class: Conoidasida. (<i>Toxoplasma gondii</i>) (<i>Sarcocystis</i>) (<i>Cryptosporidium sp.</i>) |
| 5 | Phylum Platyhelminthes, Class: Cestoda (<i>Taenia saginata</i>), (<i>Taenia solium</i>), (<i>Dipylidium caninum</i>), (<i>Dipylidium latum</i>), (<i>Hymenolepis nana</i>), (<i>Hymenolepis diminuta</i>), (<i>Echinococcus granulosus</i>) |
| 6 | Phylum Nematoda, General characteristics, Class: Chromadorea (<i>Ascaris lumbricoides</i>), (<i>Necator americanus</i>) |
| 7 | Determination of the capacitance of unknown capacitors by discharging method |
| 8 | Phylum Nematoda, Class: Secernentea, (<i>Enterobius vermicularis</i>), (<i>Ancylostoma duodenale</i>), Class: Enoplea (disputed). (<i>Trichinella spiralis</i>), (<i>Trichuris trichura</i>), (<i>Strongyloides stercoralis</i>), (<i>Wuchereria bancrofti</i>), (<i>Loa loa</i>) |
| 9 | Medical arthropods: Anopheles, Musca domestica, Tse Tse fly, Sand fly, Cimex lecturalis, Siphonaptera, Lice, Tick, Flea, Mites, Cockroaches. |

Marine Biology

In this lab students will learn methods of fields study. Water sampling techniques. Marine organisms (flora and fauna), instruments and equipment. Field marks, saving the data. Methods of analysis of marine flora and fauna using special instruments and apparatus. Statistical analysis. Scientific references. To be able to preparing reports.

The experiments include are:

| Practical Lessons at the Laboratory of Marine Biology (ZOOL 353) | |
|--|--|
| 1 | Introduction to the practical course. |
| 2 | The physical properties of sea water. |
| 3 | Marine environments |
| 4 | Plankton |
| 5 | Molluscs (Sepiida) |
| 6 | Arthropods - crabs |
| 7 | Echinodermata - Starfish |
| 8 | Cartilaginous fishes (chondrichthyans)- sharks |
| 9 | Bony fish (Osteichthyes)- Greasy grouper |

Immunology and Serology

In this lab students will understand the immune system as a defense mechanism needed to protect the body and the diseases pertaining to abnormalities within this system. Immunology & serology lab sessions offer to students the chance to understand the key components of immune system and their reactions by applying different practical techniques that will correlate between theory and practice. Also, to gain the students the opportunity to develop their observation skills, recording and data interpretation skills.

The experiments include are:

| Practical Lessons at the Laboratory of Immunology and Serology (ZOOL354) | |
|--|--|
| 1 | Introduction to the practical course, Blood Plasma and Serum, The main difference between blood plasma and serum, Examples of anticoagulants |
| 2 | Cellular constituents of Blood: RBCs, WBCs and differential (Morphological criteria, normal range and function) |
| 3 | Preparation of the Blood Film for Examination |
| 4 | Phagocytosis: In-Vitro Phagocytosis Assay |
| 5 | Serum protein electrophoresis using cellulose acetate paper |
| 6 | Antigen – Antibody Reactions: Precipitation Assays (Ouchterlony Technique) |
| 7 | Agglutination Assays: Agglutination and blood grouping; Rhesus factor test |
| 8 | Blood Cross Matching: Immediate Spin Technique (Saline Technique) IST |
| 9 | ELISA (Enzyme-Linked Immunosorbent Assay): Direct ELISA & Indirect ELISA |
| 10 | Skin Sensitivity Test: Penicillin, Hypersensitivity Test, Flowcytometry techniques |

General Entomology

Entomology is the study of those six-legged, ubiquitous organisms called insects and often includes closely related arthropods, such as mites, ticks, and spiders. Arthropods have a variety of benefits that are both tangible and intangible. They are the most diverse and abundant group of organisms on earth.

The experiments include are:

| Practical Lessons at the Laboratory of General Entomology (ZOOL356) | |
|---|--|
| 1 | Introduction |
| 2 | Insects Pinning, mounting Slide of small insects for microscopy |
| 3 | Antenna: The antennal structure. - The modification of antenna - The different types of antenna. |
| 4 | The thoracic region –Types of legs - The structure of leg (Coxa – trochanter – femur – tibia – tarsus – pretarsus). |
| 5 | The thoracic appendages: Types of wings. |
| 6 | The internal anatomy: Dissection of digestive system, Excretory system and nervous system of periplaneta Americana and locust |
| 7 | The abdominal appendages. - Non reproductive appendages (anal cerci- appendages of apterygota – appendages of immature pterygota insects). |
| 8 | Insect taxonomy: Apterygota Order orders (Collembola, Protura, Diplura, and Thysanura). |
| 9 | Insect Orders: Pterygota order (Odonata, Dermaptera, Lepidoptera, and Diptera |

Endocrinology

This lab is a level eleven. The student studies new concepts in endocrinology, sectors in some glands, clarification of the mechanisms of gland function, and the diagnosis of some diseases resulting from a defect in the activity of these glands.

| Practical Lessons at the Laboratory of Endocrinology (ZOOL451) | |
|--|---------------------------------------|
| 1 | Introduction to the practical course. |
| 2 | General properties of hormones |
| 3 | Hypothalamus and Pituitary gland. |
| 4 | Pineal gland. |
| 5 | Thyroid gland. |
| 6 | Parathyroid gland |
| 7 | Thymus gland. |
| 8 | Adrenal gland. |
| 9 | Pancreas. |
| 10 | Sexual glands |

Embryology

This lab is designed for the students to understand gamete formation, fertilization and embryo development concepts in animals. To examine teratological defects of developing embryos. To examine the development of some organ systems, as well as a look into the development of sensory organs. To study the stem cells, different types, and its role in regenerative medicine. types of artificial insemination, collection of sperms and eggs, artificial insemination. Also in vitro fertilization (ICSI) in humans and test tube babies. embryonic membranes and twins.

| Practical Lessons at the Laboratory of Embryology (ZOOL 452) | |
|--|---|
| 1 | Introduction to the practical course. |
| 2 | Male Genital System: in Amphioxus, Amphibia, Birds and Mammals. |
| 3 | Spermatogenesis |
| 4 | Female Genital System: in Amphioxus, Amphibia, Birds and Mammals. |
| 5 | Oogenesis |
| 6 | Embryonic development of Amphioxus |
| 7 | Embryonic development of Toad (1) |
| 8 | Embryonic development of Toad (2) |
| 9 | Embryonic development of Birds (1) |
| 10 | Embryonic development of Birds (2) |

Animal Ecology and Behavior

These lessons aim to provide students with Students will also obtain information that develops their scientific awareness to differentiate between different types of behaviors and factors affecting positively and negatively. practical skills that enable them to deal with animals and various scientific equipment.

| Practical Lessons at the Laboratory of Animal Ecology and Behavior (ZOOL 454) | |
|---|--|
| 1 | Introduction to the practical course. |
| 2 | Locomotory behavior measure |
| 3 | Measure of Social behavior |
| 4 | Measure of Aggressive Behavior in Females |
| 5 | Measurement of fear and anxiety behavior in the plus-maze |
| 6 | Measurement of learning ability in the Shuttle Box, Water maze and T-maze |
| 7 | Measurement of depression in the light and dark box, Tail Suspension, Forced swimming and Open-field tests |

Medical Economic Entomology

This lab aims to:

To introduce students to insects of medical importance and the diseases they transmit (such as malaria, and Arboviral), as well as insects of agricultural pests and the economic damage they cause. To describe biology, physiology, ecology and genomics of insects, as well as present means used for their control and the diseases they transmit, including recent biotechnology-based applications.

The experiments include are:

| Practical Lessons at the Laboratory of Medical Economic Entomology (ZOOL 456) | |
|---|--|
| 1 | Introduction |
| 2 | Life cycle of mosquitoes and diseases transmission, types from Genera Culex, Aedes, Anopheles and medical important. Types of medical insects from Family: Ceratopogonidae and Family Psychodidae |
| 3 | Types from Families Muscidae, Calliphoridae, Sarcophagidae, Cuterebridae, Oestridae and medical important |
| 4 | Cockroaches, Types and Life cycle. |
| 5 | Order: Phthiraptera, Types and life cycle. |
| 6 | Order Hemiptera, Life cycle of Bugs and medical important |
| 7 | Order Siphonaptera Life cycle of fleas and medical important |
| 8 | Economic importance and control of some species from orders, Orthoptera, Isoptera, Thysanoptera, Hemiptera, Homoptera, |
| 9 | Species from orders Lepidoptera and Coleoptera, Economic importance and control. Silk worm and Bee |
| 10 | Biological control. Predators and parasitoids |

Plant Morphology and Anatomy

This course aims at giving the student knowledge in the fields: study of the germination of seeds, Morphology of fruit, stem and leaf, plant cell structure, tissues, anatomy of root, stem and leaf. Plant Morphology and Anatomy. Seed germination. Plant morphology and anatomy in relation to habitat.

The experiments include:

| Practical Lessons at the Laboratory Plant Morphology and Anatomy (BOTN 241) | |
|---|---|
| 1 | Introduction- study of Light and electron microscope. |
| 2 | Morphology of root system -types and modifications. |
| 3 | Morphology of shoot system -types and modifications. |
| 4 | Plant cell structure and organelles. |
| 5 | Non-living components - Plant tissues structure and function. |
| 6 | Anatomy of young roots (Monocot and Dicot). |
| 7 | Anatomy of young stems (Monocot and Dicot). |
| 8 | Normal secondary thickening of root and stem. |
| 9 | Anomalous secondary thickening of root. |
| 10 | Anomalous secondary thickening of stem. |
| | Anatomy in relation to habitat (Aquatic, halophytes). |

Archegoniates

The study of Archegoniates are very interesting which helps you to trace the development of plants from undifferentiated Thallus to organized plant body with perfect roots, stem and leaves; non-vascular plants to vascular plants and spore producing plants to seed bearing plants. It will also help you to understand the evolutionary history of plants.

The experiments include are:

| Practical Lessons at the Laboratory of Archegoniates (BOTN 242) | |
|---|--|
| 1 | Introduction to Archegoniates |
| 2 | Bryophyte Classification and Riccia (Liverwort) |
| 3 | Marchantia (Liverwort) |
| 4 | Anthoceros (Hornworts) |
| 5 | Funaria (Moss) |
| 6 | Pteridophytes classification, Steles in Pteridophytes and Psilotum |
| 7 | Lycopodium and Selaginella |
| 8 | Equisetum and Marsilea |
| 9 | Pteridium, Adiantum and Pteris |
| 10 | Gymnosperms Classification, Cycas, Juniperus, Pinus |

Plant Water and Soil Relationships

This course is designed to reinforce the principles of: water and solution properties, colloidal systems, plasmolysis in plant cells, osmosis and osmotic pressures, factors influencing membrane permeability, and plants relation with soil's chemical and physical properties. The course also examines root hairs for water uptake, plant nutrition and its deficiency symptoms, plant responses to stresses related to soil and water physical and chemical properties, as well as examining stomata in plant leaves.

The experiments include are:

| Practical Lessons at the Laboratory of Plant Water and Soil Relationships (BOTN 341) | |
|---|---|
| 1 | Introduction; Safety requirements in laboratories; Classification of laboratories according to biosafety levels |
| 2 | Preparation of hydrophilic and hydrophobic colloidal solutions |
| 3 | An experiment demonstrating the proof of phase reversal of colloids; An experiment showing the presence of electric charges on colloidal particles |
| 4 | Plasmolysis clarification experiment |
| 5 | Membrane permeability & effect of organic solvents on permeability |
| 6 | Effects of pH and temperature on membrane permeability |
| 7 | The role of microbes in the nitrogen cycle |
| 8 | Soil properties and soil particles; Determination of the field capacity of soil |
| 9 | Transpiration and stomatal density determination; water absorption from root hair area |

Taxonomy of Flowering Plant

The plant taxonomy course deals with the study of flowering plants and representing the interrelationships among dicot and monocot plants. This course shows the phylogeny trends between plant species of one genus from one side and plant genus of one family from another side. It can predict the transitional plants and extinct taxa. It reflects the environmental effects on plant habit. It can draw the nature of wild plants (Flora of such area) and enhance their important. Molecular biology can change the tools of plant classification through improve the inter and intra genetical approaches and procedures. The new taxa and hybrid varieties can be produced for different purposes.

The experiments include are:

| Practical Lessons at the Laboratory of Taxonomy of Flowering Plant (BOTN 342) | |
|---|--|
| 1 | Flower part dissection |
| 2 | Corolla shapes and aestivation demonstration |
| 3 | Androecium and pollen grains examination |
| 4 | Gynoecium structure examination |
| 5 | Types of ovules examination |
| 6 | Floral position and Placentation |
| 7 | Different Inflorescence structures |
| 8 | Different Fruit structures |
| 9 | Stages of Seed formation |
| 10 | Examples of Monocotyledonous and Dicotyledonous families |

Plant Hormones

This lab aims to:

In this practical lesson the student learns and examines practically a brief overview of the five major types of plant hormones: auxin, gibberellin, cytokinin, ethylene, and abscisic acid. By the end of this practical course, the student will be able to determine the roles and functions of these hormones on tropisms and others.

The experiments include are:

| Practical Lessons at the Laboratory of Plant Hormones (BOTN 344) | |
|--|-------------------------------------|
| 1 | Introduction and lab safety |
| 2 | Seeds and Plant Growth Stages |
| 3 | Plants hormones types and responses |
| 4 | Phototropism |
| 5 | Geotropism- Hydrotropism |
| 6 | Chemotropism- Thigmotropism |
| 7 | Nastic movement |
| 8 | Chlorosis - Apical dominance |
| 9 | Photoperiods |

Plant Physiology

This lab aims to:

Provide students with the following concepts: Study of Enzymes, Photosynthesis, Respiration, Nutritional Metabolism, Enzymology, Photochemical reactions of photosynthesis and photophosphorylation, Biochemical reactions of photosynthesis and carbon fixation, Cell respiration, Respiratory electron transport and oxidative phosphorylation.

The experiments include are:

| Practical Lessons at the Laboratory of Plant Physiology (BOTN441) | |
|---|---|
| 1 | Enzymology. Enzyme Structure. Enzyme Catalysis |
| 2 | Enzymology. Enzyme Classification. Michaelis–Menten kinetics. Regulation. |
| 3 | Photosynthesis. Chloroplast. Thylakoid Molecular Assembly. Pigments. |
| 4 | Photochemical Reactions. Biochemical Reactions. C3, C4, CAM. |
| 5 | Photosynthesis. Photorespiration. CO ₂ Enrichment. |
| 6 | Respiration. Mitochondria. Glycolytic Pathway. TCA Cycle. |



Economic Botany

The Economic Botany course deals with the importance of plants in aspects of different uses. Each plant has a specific economic value which serves the human needs in different fields. The world nutrition depends mainly on plant crops. All industrial and medicinal sectors focus on the benefits of plant products such as clothing, furniture, volatile oils etc. The course studies the economic value of each plant and how to improve, develop and preserve it.

The lessons include are:

| Practical Lessons at the Laboratory of Economic Botany (BOTN 442) | |
|---|--|
| 1 | Demonstration of cereal plants and their economic values |
| 2 | Demonstration of legume plants and their economic values |
| 3 | Demonstration of oily plants and their economic values |
| 4 | Demonstration of fibre plants and their economic values (P.1) |
| 5 | Demonstration of fibre plants and their economic values (P.2) |
| 6 | Demonstration of sugar plants and their economic values |
| 7 | Demonstration of vegetables and fruits and their economic values |
| 8 | Demonstration of volatile oil plants and their economic values |
| 9 | Demonstration of medicinal plants and their economic values |
| 10 | Demonstration of beverage plants and their economic values |

Plant Ecology

The plant Ecology course deals with the study of different plant habitats. The soil is analyzed to investigate its properties. There are different plant types which adapt the different environmental conditions. Each plant has morphological and anatomical modifications which are examined referring to the type of adaptation.

The experiments include are:

| Practical Lessons at the Laboratory of Plant Ecology (BOTN 443) | |
|--|---|
| 1 | Soil components investigation |
| 2 | Study of soil water types |
| 3 | Calculate soil moisture, soil field capacity and soil wilting point |
| 4 | Calculate soil porosity and soil texture |
| 5 | How to use the sieve method to measure soil texture |
| 6 | How to use the Hydrometer method to measure soil texture |
| 7 | Compare different soil types by microscope |
| 8 | Examine different adapted plant habitat morphologically |
| 9 | Examine different adapted plant habitat anatomically |
| 10 | Study of plant growth parameters |

Bacteriology

This is a dedicated class for the introduction of the microorganisms to the students. We will perform the experiments on different types of microscopes, different types of sterilization, types of media, Isolation of microorganisms, how to calculate the number of microorganisms in the given sample, Shapes of cells of microorganisms, different staining techniques, Bacterial motility and some Biochemical Tests.

The experiments include are:

| Practical Lessons at the Laboratory of Bacteriology (MICR231) | |
|---|---|
| 1 | Introduction and Lab Safety |
| 2 | Introduction of compound Microscopes and Electronic Microscopes |
| 3 | Different types of sterilization |
| 3 | Media for the growth of different types of microorganism and their constituents |
| 4 | Isolation of the Microorganisms |
| 5 | Calculate the number of microorganisms in the given sample. |
| 6 | Physical Shapes of the cells and their arrangement |
| 7 | Different Staining techniques |
| 8 | Bacterial motility |
| 9 | Biochemical Tests |

Virology

Virology laboratory introduces students to different characteristics of viruses, disease symptoms, Isolation, enumeration and other physiological aspects. It also teaches how to diagnose a viral disease.

| Practical Lessons at the Laboratory of Virology (MICR232) | |
|---|--|
| 1 | Lab Safety |
| 2 | Introduction – Viral Diseases |
| 3 | Introduction – Viral shapes |
| 4 | Isolation of bacteriophage from sewage |
| 5 | Enumeration of bacteriophage in a sample by plaque forming unit |
| 6 | Perform experiments to determine One Step Growth Curve of Bacteriophage |
| 7 | Determination of cross-infectivity of <i>E. coli</i> Phage |
| 8 | Perform experiments to demonstrate lysogeny and isolation of Rhizobium Phage |
| 9 | Demonstration of the presence of Cyanophages |
| 10 | Perform experiments to demonstrate the presence of actinophage |
| 11 | Isolate Bacteriophages from flies |
| 12 | Perform experiments pf Virus-haemagglutination test for the presence of antigens |
| 13 | Perform experiments to isolate high titre of bacteriophage |

Phycology

This lab aims to:

To provide the students with a basic fundamental knowledge of how microorganisms grow, react with specific types of growth media and their biochemical reactions with media used in identification.

The experiments include are:

| Practical Lessons at the Laboratory of Phycology (MICR331) | |
|--|---|
| 1 | Introduction |
| 2 | Biosafety in microbiology lab |
| 3 | Methods for isolation and purification of algae |
| 4 | Blue-green algae: Gluocaba - Shrococcus |
| 5 | Blue-green algae: Nostoc - Anabaena Rivularia - Scytonema |
| 6 | Green algae: Chlamydomonas - Pandorina– Volvox |
| 7 | Green algae: Hydrodictyon - Spirogyra - Codium |
| 8 | Green algae: Halimeda - Scenedesmus - Ulva |
| 9 | Chara algae |
| 10 | Algae Euglena: Euglena - Vaccus |
| 11 | Diatomaceous algae, diatoms, golden yellow algae, Vaucheria |
| 12 | Brown algae: Dictyota - Padina - Sargassum |
| 13 | Red algae : Gracilaria Corallina - Polysiphonia |

Mycology and Plant Pathology

In this lab students will be able to: isolate and identify fungi and maintain them in pure cultures; demonstrate an understanding of the principles of plant pathology and the application of these principles in the control of plant disease; demonstrate skills in laboratory, field and glasshouse work related to mycology and plant pathology.

The experiments include are:

| Practical Lessons at the Laboratory of Mycology & Plant Pathology (MICR 333) | |
|--|---|
| 1 | Introduction and Lab Safety |
| 2 | Equipment and tools in the laboratory |
| 3 | Different types of sterilization |
| 4 | Media for the growth of different types of microorganism and their constituents |
| 5 | Isolation of Fungi |
| 6 | Koch's theory - collecting samples for isolation - steps and methods of isolation |
| 7 | Morphological and Microscopical examination of some fungal species and genera |
| 8 | Study of some phytopathogenic fungi |
| 9 | Study of some bacterial plant diseases |
| 10 | Study of some viral plant diseases |
| 11 | Study of some parasitic plant diseases |
| 12 | A study of some parasitic flowering plants |
| 13 | Diseases of elements deficiency in plants |

Microbial Physiology

This is a dedicated class to see the physiological effect on the bacteria and fungi. We will perform the experiments on effect of temperature, pH, Osmotic pressure, Nitrate reduction, Hydrogen sulphide production, Effect of radiation and some biochemical tests.

The experiments include are:

| Practical Lessons at the Laboratory of Microbial Physiology (MICR 334) | |
|--|---|
| 1 | Introduction and Lab Safety |
| 2 | Basic Laboratory and Culture techniques |
| 3 | Measurement of growth of Microorganisms |
| 4 | Effect of temperature |
| 5 | Nitrate Reduction |
| 6 | Hydrogen sulphide production |
| 7 | Catalase production |
| 8 | Effect of osmotic pressure on cells of microorganism. |
| 9 | Effect of pH on growth of microorganisms |
| 10 | Effect of radiation on growth of microorganisms |
| 11 | Biochemical Tests |

Industrial Microbiology

In this lab students will be able to: Explain relationship between Microorganism and Industrial food, Production of Metabolites, Industrial enzymes, Amino acid, Organic acids, Antibiotics, Vitamins and Single Cell Proteins.

The experiments include are:

| Practical Lessons at the Laboratory of Industrial Microbiology (MICR 431) | |
|---|---|
| 1 | Introduction and Lab Safety |
| 2 | Culture media using for growth of industrial microbes |
| 3 | Production of yogurt |
| 4 | Production of yeast |
| 5 | Ethanol production |
| 6 | Citric acid production |
| 7 | Methods of Acetic acid production |
| 8 | Microbial enzymes production– Amylase, Protease, Cellulase |
| 9 | The production of antibiotics by microorganisms -Production of Antibiotics: Penicillin and Streptomycin |
| 10 | Mushroom production |
| 11 | Water microbiology |

Environmental Microbiology

This course is designed to reinforce the principles of: isolation and purification of microbes from different air and water environments, practicing on multiple laboratory instruments used for microbial analysis and detections, practical experiments on microbial interactions in different ecosystems, practical tests on multiple microbial activities found in the environments, and practicing the preparation of different microbial growth media used in the field of environmental microbiology.

The experiments include:

| Practical Lessons at the Laboratory of Environmental Microbiology (MICR 432) | |
|--|---|
| 1 | Introduction |
| 2 | Safety requirements in laboratories Classification of laboratories according to biosafety levels |
| 3 | Isolate and count microbes circulating in the air |
| 4 | Isolation and counting of microbes circulating in natural water sources |
| 5 | Quantification of microbial growth |
| 6 | Isolation and total count of bacteria and fungi from soil |
| 7 | Interrelationships between microorganisms in the environment |
| 8 | The role of microbes in the nitrogen cycle |
| 9 | Types and methods of preparing food media for microbes |

Medical Microbiology

Medical Microbiology laboratory classes introduces students to the basics of Microscopy, Gram staining and different growth media. Then it gives them the hands-on training of isolation, identification and characterization of bacteria from skin, throat and stool samples. How to perform different biochemical tests, and antibiotic sensitivity test. Study different characteristics of *Staphylococcus aureus*, fungi and *Mycobacterium tuberculosis*.

The experiments include:

| Practical Lessons at the Laboratory Medical Microbiology (MICR 433) | |
|---|--|
| 1 | Introduction, Microscopy, Grams Staining and Growth Media |
| 2 | Isolate normal skin flora |
| 3 | Perform experiments to isolate normal throat flora |
| 4 | Perform experiments to identify pathogenic <i>Staphylococci</i> |
| 5 | Perform experiments for sensitivity discs in the therapeutic use of antibiotics |
| 6 | Perform experiments for enzymatic reactions |
| 7 | Perform experiments to isolate and identify bacterial cultures |
| 8 | Perform experiments to isolate enteric pathogens from stool by direct plating method |
| 9 | Perform experiments to isolate and identify fungal culture. |
| 10 | Perform experiments to isolate and identify <i>Mycobacterium tuberculosis</i> |

Research project

This course is designed to provide students with the following concepts:

- Have an introduction for Research Definition, Problems, Hypothesis and Questions
- Participate in single and group discussion and workshop for research aims and smart objectives
- Conduct a practical application for the different types of research study designs
- Discuss principles of Research Ethics and Law from the practical point of view
- Understand the writing of a research proposal with the essential elements.
- Participate in Basic research statistics.
- Identify priority problems for research
- Implement data analysis and presentation
- Develop data collection tools
- Implement simple research studies
- Prepare research proposal and research reports
- Apply the theoretical knowledge and understanding in laboratory experiments and techniques
- Predict the results of some biological problems and experiments Set-up an experiment, investigation and research project for complex issues and problems in Biology.
- Design a biological experiment and procedures in laboratory or in the field or even theoretically
- Write a report about any practical or theoretical tasks related to biological science.

Biology for health specialties

In this lab students will be able to investigate the evolution of physiological mechanisms in vertebrates, and the influence that body size has on physiology; To develop practical biological skills.

The experiments include are:

| Practical Lessons at the Laboratory of Biology for health specialties (BIOL105) | |
|---|---|
| 1 | Laboratory Requirements and Safety Measures + Microscopy |
| 2 | Prokaryotes / Eukaryotes, Animal cells / Plant Cell Cell Organelles and Inclusions |
| 3 | Mitosis & Meiosis |
| 4 | Epithelial & Nervous Tissues |
| 5 | Connective tissue, Bones & Cartilage, and Muscular tissues |
| 6 | Human Skeletal System |
| 7 | Sense Organs (Human Ear & Eye) |
| 8 | Human Brain |
| 9 | Human Blood |
| 10 | Dissection of rabbit |







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BIOLOGY

Labratories Guide