Soran University

Biology Module Specification

**1. Module Title:** Genetics

**2. Module Code:**

**3. Module Level:** third year

**4. Module Leader:** Narmeen Abdul Samad Ismaiel

**5. Teaching Semester:** First

**6. Credit Rating for the module:** 3

**7. Prerequisites and co-requisites:** general biology& cell biology

**8. Module Summary**

The lectures summaries all the general information you need to guide you during the third stage of your selected course. This booklet also describes in details the content of genetic, the names of academic staff who will teach the unit, and what you will be expected to do to make sure your success in this unit. Genetic is the science of the heredity .The discipline has a rich history and involves investigations of molecules, cells, organisms, and populations, using many different experimental approaches. Not only does genetic information play a significant role during evolution, but its expression influences the function of individuals at all levels. The genetic unifies the study of biology and has a profound impact on human affairs.

**9. Module Aims**

It is our purpose in this course to introduce and describe the processes and patterns of inheritance; we present a broad outline of the topics to be covered of some of the more important historical advancements leading to our current understanding of genetics. Give you a firmer foundation in those basics of genetics so that you can be that much more conversant and thoughtful about some major current topics in genetics. This class will provide you with an understanding of the principles and concepts of genetics Specific topics are listed below.

**10. Learning Outcomes**

After completion of this course the student will be able to:

* Understand that genes are discrete units that control the appearance of an organism.
* To understanding Mendel’s rules of inheritance segregation and independent assortment and how they relate to cytogenetic.
* design and explain an experiment that uses test crosses to determine genotypes.
* compare and contrast incomplete dominance and co-dominance and predict their modes of inheritance
* To understand that dominance is a function of the interaction of alleles; similarly, epistasis is a function of the interaction of nonallelic genes.
* To analyze the cause of sex determination in various organisms.
* Analyze the inheritance patterns of traits that loci on the sex chromosome control.
* Learned approaches which can be used for the diagnosis of genetic disease and carrier detection.
* Types of mutations, mutagens and repair systems.
* Preparation of metaphase chromosome and sperm abnormalities in mice (Mus musculus) & karyotype analysis.
* preparation of Polytene chromosome.
* Apply basic knowledge of practical approaches and techniques

**11. Syllabus**

[A list of the knowledge content of the module]

**12. Assessment Strategy**

**Examination and grading**

**Theory** (70% of total course marks)

* The average of 2 written examinations/assessments will stand for 25% of the total course marks.
* A Final examination will stand for the remaining 45% of total course marks.

**Practical** (30% of total course marks)

* The average of 2 written examinations will stand for 10% of the total course marks.
* A final examination will stand for 15% of the total course marks.
* The exam has 10 marks (mean of two examination), the attendance, classroom activities, and Daily quiz: counting 5 marks.

**13. Summary description of assessment**

[A table summarizing the assessment components of the module]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Assessment Type | Description of Item | % Weighting | Grading | Tariff | Week due |
| EXM | Theory |  60% |  |  |  |
| EXM | Practical |  30% |  |  |  |
| GWK | Quizes |  5% |  |  |  |
| PRS | Tutorial |  5% |  |  |  |

**14. Learning Session Structure**

1 x 2 h lectures and 1 x 3 h laboratory sessions per week.

**15. Learning and Teaching Methods**

Different forms of teaching will be used to reach the objectives of the course: power point presentations for the head titles and definitions and summary of conclusions, movies, photomicrographs, besides worksheet will be designed to let the chance for practicing on several aspects of the course in the classroom, furthermore students will be asked to collect samples. There will be classroom sample and slide drawing, discussions and the laboratory notes will give enough background to test, solve, analyze, and evaluate problems sets, and Literature discussions will utilize small group discussions following by classroom presentation and discussion throughout the course.

**16. Scheme of Work**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Week** | **Delivery Method** | **Content** | **Learning Materials** | **Learning** **Outcomes** | **Form of Assessment** |
| 1 | Lecture | **History of genetic** | ppt |  | the genetic theories |
| 2 | Lecture | **Mendelian genetics** | ppt |  | Mendel’sexperimental methods, Mendel’s 1st and 2nd laws, Punnett square,test cross and back cross. |
| 3 | Lecture | **Type ofdominance** | ppt |  | : Dominant/ recessive, incomplete dominance, Codominance,Overdominance, Lethal genes, Multiplealleles |
| 4 | Lecture | **Epistasis:**  | ppt |  | : Dominant epistasis , RecessiveEpistasis, , Duplicate dominant genes, Duplicate recessive genes, Dominant and recessive interaction, Gene interactions |
| 5 | Lecture | **Sex determination** | ppt |  | Genetic mechanisms of sex determination, chromosomal basis of sex determination |
| 6 | Lecture | **sex linked Inheritance (X-linked recessive and dominant traits):**  | ppt |  | Variation of sex-linkage,Pseudoautosomal Inheritance, Sex linked in Drosophila , X-linked recessive trait and examples, X-linked dominant trait and examples. |
| 7 | EXAM |  |  |  |  |
| 8 |  | **Y-linked traits, sex limited traits and Sex influenced traits,** | ppt |  | Y-linked inheritance and their examples, Sex influenced traits, sex limited traits and their examples |
| 9 | Lecture | **Chromosome aberrations, variation in****Chromosome number:**  | ppt |  | classification of chromosomes, aneuploidies of the sex chromosomes, aneuploidies of the somatic chromosomes, aneuploidy polyploidy |
| 10 | Lecture | **Variation in chromosome structure**: | ppt |  | Deficiencies/Deletions; Duplications;Inversions; Translocations and their examples |
| 11 | Lecture | **Mutation;Types****of mutation**. | ppt |  | Definition, What Are Mutations?,causes and types, Are mutations helpful or harmful?, single base-pair mutations,point mutation, substitutions, inversion, additions, Deletions,tautormeric shifts |
| 12 | Lecture |  **Mutagenic agents and the mechanisms of mutation**, | ppt |  | Mutation Physical agents, ionizing and nonionizing radiation, chemical agents, nitrous acid, hydroxylamine, base analogue mutagen, alkylating agents |
| 13 | Lecture | **Genetics of****cancer:**  | ppt |  | Cancer is a genetic disease, cell cycleregulation and cancer, causes of cancer, cancer and environment |
| 14 | exam |  |  |  |  |

Practical lecture

|  |  |
| --- | --- |
| **Week** | Experiment |
| 1 | **Introduction to genetic, genetic concept terms** |
| 2 | **Cytological basic for transmission genetics- mitosis**  |
| 3 | **Study of meiosis division in eukaryotes**  |
| 4 | **Culture of drosophila for genetic experiment**  |
| 5 | **Polytene chromosome from drosophila –salivary gland**  |
| 6 | **Mutation induction in *Drosophila melanogaster***  |
| 7 | **First exam**  |
| 8 | **Using chromatography to identify the eye mutation of *Drosophila melanogaster*** |
| 9 | **Finger prints and palmer dermatology**  |
| 10 | **Study of sex chromatin in human cells** |
| 11 | **Metaphase chromosome preparation**  |
| 12 | **Sperm preparation**  |
| 13 | **Isolation of Auxotrophic mutants and replica plating technique** |
| 14 | **Final exam** |

**17. Bibliography (or Literature)**

1-Tamarin, R.H. (2002). Principles of genetics (7th edi.). Mc Graw Hill.

2-Klug, W. S,Cumming.M.R. and Spencer.C.A. (2012). Concept of Genetics(10th edi.). pearson Hall.

3-,Cumming.M.R.. (1997). Concept of Genetics(6th edi.). printice Hall.

4-dyer.B. D. (2009). Bases of Genetics.LLC.

5. Schleif.R. (1993). Genetics and molecular biology. (second edi.).

6- Kaplan, B.J. (1978) Preparation of the normal karyotype (workbook).

hicago: American Society of Clinical Pathologists.

7-Mertens, T.R. & Hammersmith, R.L. (2014). Genetics: Laboratory Investigations. (17thedi.). Prentice Hall, Englewood Cliffs, NJ.

8-Adem.M.A. (2006). Molecular biology and applied Genetics. MOLECULAR BIOLOGY AND

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