#### Course Title: Genetics 2 (Cytology and Cytogenetics)

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| **University** | **Benha** |
| **Faculty** | **Faculty of Agriculture** |
| **COURSE SPECIFICATIONS:** | |
| Program of which the course is given | **AGRIC. BIOTECHNOLOGY PROGRAM** |
| Major or Minor element of program | Major |
| Departments offering the program | Genetics and Genetic engineering |
| Department offering the course | Genetics and Genetic engineering |
| Academic year (level) |  |
| Date of specification approval |  |

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| **A- BASIC INFORMATION** | |
| Title | Genetics 2 (Cytology and Cytogenetics) |
| Code | GE 1002 |
| Credit Hours | 3 |
| Lecture | 2 Hours / week |
| Practical | 2 Hours / week |
| Total: | Hours |

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| **B- PROFESSIONAL INFORMATION** |
| 1. OVERALL AIMS OF COURSE |
| On completion of the course, students should be able to:  Explain the organization and complexity of human genome at the Cytogenetic Level  Explain the nature of chromosomal abnormalities in clinical syndromes associated with  cytogenetic disorders  Explain the nature of chromosomal abnormalities in the disorders of sexual differentiation  Evaluate appropriately the family pedigree and the population and ethnic aspects of inherited disorders  Estimate the risk of recurrence of various inherited disorders in affected families  Explain the essential elements of genetic counseling and indications for prenatal  Diagnosis.  Understand the importance of genetics in personalized medicine |

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| 2. INTENDED LEARNING OUTCOMES OF COURSE (ILOs) |
| **A. Knowledge and Understanding:** |
| This module gives the students the opportunity to utilize:  Methods used to identify and analyze cytogenetic alteration.  Cytogenetic mechanisms of disease expression.  Cytogenetic alterations and relationship to specific clinical expression.  Cytogenetic alteration related to development of leukemia |

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| B. Intellectual Skills: |
| ***Successful completion of this course will allow students to:***   * Solve the problems for the agriculture and food plant using computers. * Understand the computer attitudes. |
| C. Professional and Practical Skills: |
| * Analysis of agriculture and industrials waste using computers. * Using Microsoft word and excel applications. |
| D. General and Transferable Skills: |
| * Analysis of agriculture and industrials waste using computers. * Using Microsoft word and excel applications. |

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| 3. CONTENTS | | | |
| **Topic** | **No. of hours** | **Lectures** | **Practical** |
| Chromosome structure, organization: Chromatin structure, nucleosomal and higher order structures, morphology and basic functions |  |  |  |
| Techniques in the study of chromosomes and  applications. |  |  |  |
| Mitotic and meiotic chromosomes, banding, karyotyping, chromosome labeling and cell cycle analysis, in situ hybridization, chromosome painting |  |  |  |
| Special types of chromosome-sex chromosomes, sex chromatin, B-chromosome, polytene and lambrush  chromosomes; Numerical and structural changes in the chromosome |  |  |  |
| Mechanisms of sex determination in plants and animals. Dosage compensation; Genome organization in viruses, prokaryotes and eukaryotes (animals and plants) |  |  |  |
| Techniques in genome analysis, genome mapping  and functional genomics; Repetitive DNA-satellite DNAs and interspersed repeated DNAs, Transposable Elements, LINES, SINES, Alu family, mechanisms of DNA amplification, genome evolution; Fine structure of gene, split genes, pseudogenes,overlapping genes and multigene families |  |  |  |
| DNA and RNA as genetic material; Chemistry  and structure of DNA. |  |  |  |
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| 4. TEACHING AND LEARNING METHODS |
| 1. The main subject areas are covered in the lectures (see syllabus Plan). 2. Several student seminar sessions give the opportunity for students to bring questions or discuss any aspects of the course with the tutor. 3. Students are given a topic to research in small groups which they report as an oral presentation. Collective feedback on the strengths and weaknesses of the presentations are provided. |

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| 5. STUDENT ASSESSMENT METHODS |
| ***Students will be evaluated by attendance, fulfillment and effort in exercises and presentations, and examination grades:***   1. Laboratory work: to assess the ability of students to understand and perform small laboratory experiments. 2. Use and maintenance of a light microscope; Mitotic and meiotic behaviour of plant and animal chromosomes, preparation of chromosomes from root tip cells of Aloe vera, bone marrow cells and spermatogonial cells of Mus musculus and Grass hopper. 3. Karyotype analysis of plant , animal and human chromosomes. Micronucleus test in Allium cepa and Mus musculus; 4. Mutagenecity testing in tester strains of Salmonella typhimurium Chromosomal aberrations in mouse bone marrow cells and peripheral blood lymphocyte   cultures,  Single cell gel electrophoresis/Comet assay in Nicotiana tabaccum var.Xanthi. |

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| 6. ASSESSMENT SCHEDULE | | |
| No | AssessmentAssessment | **Week** |
| 1 | Periodical exam |  |
| 2 | Practical exam |  |
| 3 | Oral exam |  |
| 4 | Final exam |  |

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| 7. WEIGHING OF ASSESSMENT | | |
| No | AssessmentAssessment | **%** |
| 1 | Periodical exam | 15% |
| 2 | Practical exam | 15% |
| 3 | Oral exam | 10 % |
| 4 | Final exam | 60 % |
| TOTAL | | 100 % |

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| 8. LIST OF REFERENCES |
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| 9. FACILITIES REQUIRED FOR TEACHING AND LEARNING |
| 1. Teaching aids/materials: e.g. boards – overhead projector – data-show projector – stationary.. etc. 2. Teaching room/hall. 3. Computers. 4. Facilities for site visits etc., which are necessary for teaching the course. |

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| **Course Coordinators:** | **Prof. Dr.**  **Prof. Dr.** |
| **Date: / / 2015** | |