#### Course Title: Gene technology

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| **University** | **Benha** |
| **Faculty** | **Faculty of Agriculture** |
| **COURSE SPECIFICATIONS:** | |
| Program of which the course is given | Agricultural biotechnology |
| Major or Minor element of program |  |
| Departments offering the program | All Departments |
| Department offering the course | Genetics and Genetic Engineering |
| Academic year (level) |  |
| Date of specification approval |  |

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| **A- BASIC INFORMATION** | |
| Title | Gene technology |
| Code | GE1003 |
| 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 |
| The course is designed to provide an introduction to the breadth of research techniques and strategies used in modern  genetic engineering technology. The course is not designed to  give detailed protocols; there is no laboratory component.  Instead the objective is to familiarize students with the wide  variety of research options currently available in biotechnology, and provide some theoretical background regarding the applicability of these various techniques to specific scientific inquiries. |

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| 2. INTENDED LEARNING OUTCOMES OF COURSE (ILOs) |
| **A. Knowledge and Understanding:** |
| ***By the end of the course, students should:***   * describe the function of commonly used enzymes within the field of molecular biotechnology * from a given problem, design a suitable PCR-setup/strategy; for example, how to clone a certain gene, and explain the function of all necessary components * explain the principle behind different DNA-sequencing methods and discuss their possible strengths and weaknesses * give examples of different physical and genetic strategies for modification/manipulation of gene expression and describe which consequences this will have at a cellular level * describe different mutagenesis, screening, and selection methods that are used within protein engineering and suggest strategies for how these techniques can be applied in order to solve/address a given issue * from a given issue or problem, choose an appropriate combination of host-vector system and describe its specific advantages and disadvantages in relation to other conceivable combinations. The student should also be able to describe/explain the function of the different vector component/elements * describe the principles behind modern gene technology-based therapeutics such as modern vaccines and gene therapy, and give examples on some of the advantages/disadvantages and possible limitations compared with traditional treatments * give examples of methods for transcriptome and proteome analysis and explain the underlying principles * present and evaluate a laboratory exercise in a written report |

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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** |
| Introduction to macromolecular structures |  |  |  |
| DNA replication and the lactose opeon |  |  |  |
| Basic DNA cloning techniques/strategies |  |  |  |
| Library construction |  |  |  |
| Nucleic acid hybridization strategies |  |  |  |
| The Polymerase Chain reaction |  |  |  |
| Nucleic acid sequencing |  |  |  |
| Genetic mapping /molecularmarkers |  |  |  |
| Genetic fingerprinting |  |  |  |
| Gene expression systems - bacterial, yeast, Plants, animals |  |  |  |
| Structural and Functional Genomics |  |  |  |
| Bioinformatics |  |  |  |
| Proteomics |  |  |  |
| Animal cloning/ stem cells |  |  |  |

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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. |

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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 |
| Biotechnology: Academic Cell Update Edition Academic Press  David P. Clark, Nanette J. Pazdernik ISBN: 0123850630, 9780123850638  All academic work must meet the standards contained in "A Culture of Honesty." Each student is responsible to inform themselves about those standards before performing any academic work. |

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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** | |