

A- Basic Information

Title: *Genetic Engeneering*

Code: Z667

Credit Hours: 3

Lecture: 2

Tutorial: 2

Practical: 2

Total: 3

B- Professional Information

1- Overall aims of the course: By the end of this course, the student will be able to:

Demonstrate knowledge of the basic concepts in DNA structure, hybridization, DNA sequencing, restriction enzymes, as well as getting of DNA into cells, plasmids, and bacteriophages as cloning vectors..

2- Intended Learning Outcomes (ILOs):

a- Knowledge and Understanding:

- a1- Define the main items of genetic engineering, like restriction enzymes, plasmids, transformation and cloning.
- a2- Understanding the biology of genetic engeneering.
- a3- Illustrate the different methods for nucleic acid isolation..
- a4- Know the hybridization and sequencing of DNA.
- a5- Know the list of restriction enzymes.
- a6- State and conclude the gene structure and expression.
- a7- Summarize different methods for DNA insertion into cells.
- a8- Explain the cloning strategies.

b- Intellectual Skills:

- b1- Analyze and compare between DNA and RNA structures.
- b2- Conclude the different methods of nucleic acid sequencing and hybridization.
- b3- Determine the principles of restriction digestion and analysis.
- b4- Evaluate the getting of genes cells.
- b5- Application of genetic engeneering in diagnosis and production of biochemical compounds.
- b6- Conclude the vectors and host cells.
- b7- Analyze the mechanism of cloning DNA and mRNA.

c- Professional and Practical Skills:

- c1- Use appropriate lab equipment and tools for designing different gene and protein synthetic constructs.

c2- Design and perform experiments in the lab and field within proper technical, scientific and ethical frameworks in organism gene manipulation and genetic engineering.

c3- Collect, preserve, store and handle samples and specimens for testing the success of gene manipulation of the genetically-engineered organisms.

d- General and Transferable Skills:

d1- Write reports gene manipulation success.

d2- Computer-based mining of databases and references about gene manipulation methods and success.

d3- PowerPoint- based presentations for reports in seminars or group meetings.

d4- Work coherently and successfully as a part of team in projects and assignments.

d5- Study and find information independently, and finding realistic solutions through right analysis and anticipation.

3- Contents:

Topic	No. of hours	Tutorial/ Practical	Lecture
DNA structure	2	-	2
DNA isolation	4	2	2
Hybridization	4	2	2
Sequencing of nucleic acids	4	2	2
Gene structure of pro- and eukaryotes	4	2	2
Gene expression	4	2	2
Cloning vectors: plasmids, bacteriophages	4	2	2
Restriction enzymes	4	2	2
Gene cloning	4	2	2
PCR	4	2	2
PCR	4	2	2
Applications of genetic engineering in agriculture and food production.	2	-	2
Applications of genetic engineering in medicine and diagnosis	2	-	2

4- Teaching and Learning Methods

4.1- Lectures

- 4.2- Oral presentations.
- 4.3- Research assignment.
- 4.4- Exams.

5- Student Assessment Methods

- 5.1- Reports to assess collection of course material.
- 5.2- Mid-term exam to assess mid-term performance.
- 5.3- Final exam to assess final term performance.

Assessment Schedule

Assessment 1: Reports	a report/ three weeks.
Assessment 2: Report defense	a presentation/ three weeks.
Assessment 3: Mid-Term	week 8 (Mid-Term week)
Assessment 4: Final term exam	week 15 -16 (final-Term week)

Weighing of Assessments

Mid-term examination:	20 %.
Final-term examination	40 %.
Oral examination	00%
Practical examination	20%
Semester work	20%
Other types of assessment	00%
Total	100%

6- List of references

6.1. Essential Books

O'Donnell, C.P(2012):Ozone in food processing

Handa,S.K (2012): principles of pesticide chemistry

Hodgson ,Emest (2012): pesticide biotransformation and disposition

Fayez ,A.A (2011): pesticide residues analysis of chloropyrifos- ethyl ,penconazol and imidacloprid on tomato fruits and their stability under environmental conditions

6.2. Recommended Books:

- Genetic engineering: a reference handbook. By: Harry Le Vine, 1999.
- Genetic engineering: a documentary history. By: Thomas Anthony Shannon, 1999

6.3. Periodicals, Websites,etc

- Google books: <http://books.google.com/bkshp?hl=en&tab=wp>
- <http://www.sciencedirect.com/>

- <http://www.ncbi.nlm.nih.gov/pubmed/>
- Nucleotide database:
<http://www.ncbi.nlm.nih.gov/nucore>
- Protein database:
<http://www.ncbi.nlm.nih.gov/protein>
- Sanger Institute genome database:
www.sanger.ac.uk

7- Facilities Required for Teaching and Learning:

- Dark class room equipped with Data show device.
- Molecular biology lab equipped with: PCR cyclers, electrophoresis units, trans-illuminator, incubator and water bath-shaker.

Course coordinator: Prof. Sobhy Hassab El-naby
Head of Department. Prof. Saber Sakr