

# Soran University

## Biology Module Specification

- 1. Module Title:** Plant biotechnology
- 2. Module Code:**
- 3. Module Level:** Bachelor - Fourth year (General biology)
- 4. Course administrator:** Dr. Laith Ibrahim
- 5. Teaching Semester:** First
- 6. Credit Rating for the module:** 3
- 7. Prerequisites:** plant biology, plant physiology, genetic engineering

### **8. Module Summary**

Plant biotechnology is the use of genetic engineering in horticultural science. It concerns the development of genetically engineered plants (transgenic) plants for the protection of plants against microbial pathogens, abiotic stress. It also involves genetically engineering plants for improving food production, protecting the environment from pollution or using plants as factories to produce pharmaceutically or industrially important compounds.

### **9. Module Aims**

To increase students awareness and appreciation for plant biotechnology and its applications in science and industry. Plant biotechnology is used to make plants resistant to biotic and abiotic stresses, to improve food production and it also can be used in industry ( like environmental monitoring and clean-up and production of pharmaceutically important compounds).

### **10. Learning Outcomes**

Upon completion of the course, you will be able to describe:

1. How plant can be grown and replicated *in vitro*
2. How to use tissue culture techniques to regenerate plants from explants
3. How genetic engineering techniques are used in plant biotechnology
- 4- How plant transformation techniques are used in plants
- 5- How to produce transgenic plants that are resistant to microbial pathogens or biotic stress
- 6- How to use plants as factories to produce vaccines in plant cells.

## 11. Syllabus

Weak1	Introduction to plant biotechnology
Weak2	Plant cell and how plants respond to the external environment
Weak3	Plant tissue culture techniques
	1 <sup>st</sup> Midterm EXAM
Weak4	Genetic engineering techniques
Weak5	plant transformation techniques
Weak6	Engineering plants resistant to microbial pathogens
Weak7	Engineering plants resistant to abiotic stress and transgenic plants for high food production
	2 <sup>nd</sup> Midterm EXAM
Weak8	transgenic plants for environmental cleanup and monitoring
Weak9	Plant pharming (plants as factories to produce vaccines, proteins, enzymes)
Weak10	Induced resistance in plants- an environmentally friendly method to activate resistance in plants
Weak11	GMO debate (the debate over genetically modified organism)
	3 <sup>rd</sup> Midterm EXAM

## 12. Assessment Strategy

There are two parts to this course, the lecture and the laboratory. The lecture will provide an opportunity to discuss conceptual information in the text, and current topics in the subject. The laboratory will provide hands-on opportunities in structured labs and in independent investigations. Both will count significantly to student's final grade.

## 13. Summary description of assessment

[A table summarizing the assessment components of the module]

Assessment Type	Description of Item	% Weighting	Grading
Theory EXM	-Exam questions will be of different types: (define, compare, give reason to the following, discuss briefly, problem-based questions, illustrate).	60 %	Excellent: $\geq 90$
3 Midterm EXM		20 %	Very Good: 80-89%
Final EXM		40 %	Good: 70-79 % Medium: 60-69 % Fair: 50-59 %

<b>Practical EXM</b>	Exam questions will be of different types to evaluate the understanding of students of lab experiments	<b>35 %</b>	
Midterm EXM		15 %	
Final EXM		20 %	
Report/Seminar		5 %	

## 14. Learning Session Structure

1 x 2 h lectures, 1 x 2 h practical sessions, the lectures will be in the form of power point slides(ppt).

## 15. Bibliography



**17. Prepared by**  
Dr. Laith ibrahim

**18. Validated and Verified by**