

## Basic Information

<b>Course Code</b>	
<b>Course Title</b>	Diagnosis of Plant Bacterial Disease
<b>Academic Year</b>	2022/2023
<b>Academic Program</b>	New Professional Diploma in Plant Clinic and Phytosanitary Technologies
<b>Hours/week semester</b>	Lectures: 1                      Practical: 2    total: 2

**Course Description:** This course introduces students to the economic importance of bacterial diseases; plant pathogenic bacteria; ecology and spread of bacterial diseases; host range; measurement of bacterial growth; diseases caused by plant pathogenic bacteria; entry of bacteria into plants; pathogenicity and virulence factors in bacterial diseases; plant response to bacterial infection; diagnosis of bacterial diseases: symptoms, microscopic examination, isolation, gram stain test, biochemical tests, serological tests, fatty acid-based tests, Polymerase Chain Reaction (PCR)-based analysis, pathogenic

### 1. Course Aims

1. To gain understanding on the importance of diseases caused by bacteria in crops
2. To understand the spread, infection and survival of plant pathogenic bacteria
3. To understand and gain skills in diagnosing diseases caused by bacteria in plants.
4. To gain knowledge on the causes, symptoms, disease development, spread and management of key bacterial diseases affecting crops diseases in Egypt

### 2. Intended Learning Outcomes

#### 2.1. Knowledge and Understanding

On successful completion of this course, the student should be able to

- 2.1.1- Mention the importance of diseases caused by bacteria in crop
- 2.1.2- Understand the plant bacterial symptoms
- 2.1.3- Know the study of chemical and morphological structure of plant bacteria
- 2.1.4- Recognize the damage types caused by plant bacteria on different crops
- 2.1.5- Lists the different methods used to detection and diagnoses of plant bacteria

#### 2.2. Intellectual Skills

By the end of this course, the student should be able to

- 2.2.1- Conclude the methods of identify bacterial pathogens affecting plants
- 2.2.2- Evaluate the appreciate methods for detect different plant bacterial species on agricultural crops
- 2.2.3- Evaluation of the use of an integrated program to control and reduce the bacterial diseases on economic crops

#### 2.3. Practical and Professional Skills

By the end of this course, the student should be able to

- 2.3.1- Distinguish between the symptoms of various plant bacterial diseases.
- 2.3.2- Determining the percentage of infection and the actual disease severity with bacteria infections and how to limit its damage
- 2.3.3- Utilize standard laboratory procedures and techniques in experimental applications in detection and identification of plant bacteria

- 2.3.4- Discuss the sources of inoculum, infection and spread plant bacterial disease
- 2.3.5- Describe procedures of and conduct tests in diagnosing plant diseases caused by bacteria
- 2.3.6- Recognize, describe the causal agents, symptoms, disease development and management of common diseases caused by bacteria in Egypt

#### 2.4. General and Transferable Skills

By the end of this course, the student should be able to

- 2.4.1- Writes and presents specialized reports to explain different percentage of infection and the actual disease severity
- 2.4.2- Think independently, and solve problems on scientific basis
- 2.4.3- Communicates with colleagues and works in a research team
- 2.4.4- Identify roles, tasks, and set clear guidelines and performance indicators
- 2.4.5- Demonstrates self-learning and continuous capabilities to develop professional skills
- 2.4.6- Address the community linked problems with considerable attention to the community ethics and traditions

#### Course content

Topics	Total (hr)	Lectures (hr)	Practical (hr)
Economic importance of bacterial diseases, classes of bacteria containing plant pathogens, types of diseases caused by bacteria	4	2	4
Presumptive diagnosis (symptoms, sample collection and handling), Isolation, cultural characteristics,	8	4	8
Gram staining, physiological and biochemical tests	4	2	4
Serology, nucleic acid analysis, fatty acid analysis, pathogenicity tests	4	2	4
Bacterial growth, measurement of growth in bacteria	4	2	4
Epidemiology of bacterial diseases, management of bacterial diseases of plants	4	2	4
<b>Total</b>	28	14	28

#### 4. Teaching and Learning Methods

- Lectures:** Interactive lectures through:
- Teaching lectures to gain knowledge and understanding skills
  - Seminars
  - Group discussions
- 
- Practical sessions:**
- Laboratory lessons (Practical sessions) to gain practical skills
  - Field visits
- 
- Self-Learning activities:**
- Assays and reporting in different topics
  - Analyze the results and reach specific conclusion
  - Sample collection, preservation, examination and identification

#### 5. Teaching and Learning Methods for Students of Limited Capabilities

- Additional revisions for previously taught and difficult topics

- Providing a summary for previous chapter at the end of each one
- Following up student feedbacks

6.1. Methods	6. Student Assessment			
	Intended Learning Outcomes Covered			
	KU	IS	PPS	GTS
Written exams	2.1.1/2.1.2/2.1.3/2.1.4/2.1.5	2.2.1/2.2.2/2.2.3		
Practical exams			2.3.1/2.3.2/2.3.3/2.3.4	
Oral exams		2.2.1/2.2.2/2.2.3		2.4.1/2.4.2/2.4.3/2.4.4/2.4.5/2.4.6
Student activities				2.4.1/2.4.2/2.4.3/2.4.4/2.4.5/2.4.6

KU, knowledge and understanding; IS, intellectual skills; PPS, practical and professional skills; GTS, general and transferable skills

## 6.2. Exam Description

Written exams	<ul style="list-style-type: none"> <li>• Short essays</li> <li>• Drawing</li> <li>• Multiple choice questions</li> <li>• Comparisons</li> <li>• Giving the scientific term/information</li> <li>• Reasons for what comes</li> </ul>
Practical exams	<ul style="list-style-type: none"> <li>• Inclusion bodies slideshow exams</li> <li>• Practical case studies</li> <li>• Exams on plants of the faculty farm</li> </ul>
Oral exams	<ul style="list-style-type: none"> <li>• The exam committee involves at least 3 examiners</li> <li>• Each evaluates the student by giving a separate score</li> <li>• The scores are then averaged</li> <li>• The student randomly selects question cards</li> </ul>
Student activities	<ul style="list-style-type: none"> <li>• Self-learning activities are evaluated throughout the semester</li> </ul>

6.3. Assessment Schedule		6.4. Weighing of Assessments
Exams and activities	Week (in each semester)	Total (%)
Semester work exam	4 <sup>th</sup> , 8 <sup>th</sup> and 12 <sup>th</sup>	10
Student activities	Throughout the semester	10
Final written exam	15 <sup>th</sup>	50
Final Practical exam	15 <sup>th</sup>	20
Final oral exam	15 <sup>th</sup>	10
<b>Total</b>		<b>100</b>

## 7. List of References

---

### 7.1. Course Notes

---

Course notes will be given at the beginning of each lecture

---

### 7.2. Essential Books

---

Agrios, G. N. 2005. *Plant pathology, 5th Edition*. Elsevier Academic Press, 84 Theobald's Road, London WC1X 8RR, UK.

Anne M. Alvarez. 2004. *Integrated approaches for detection of plant pathogenic bacteria and diagnosis of bacterial diseases*. *Annual Review of Phytopathology* 42:339–66.

Billing, E. 1987. *Bacteria as plant pathogens*. VanNostrand Reinhold (UK) Co. Ltd.

Elphinstone, J. G., Stead, D. E., Caffier, D., Janse, J. D., López, M. M., Mazzucchi, U., Müller,

---

### 7.3. Recommended Books

---

P., Persson, P., Rauscher, E., Schiessendoppler, E., Santos, M. S., Stefani, E., van Fahy, D. C., and Persley, G. F., eds. (1983). "Plant Bacterial Diseases: A Diagnostic Guide." Academic Press, New York.

Goszczyńska, T., J. J. Serfontein and S. Serfontein. 2000. *Introduction to practical phytobacteriology: A manual for phytobacteriology*. SAFRINET, the Southern African (SADC) Loop of BIONET-International, ARC-Plant Protection Institute, Pretoria, South Africa.

Krieg, N. R. and J. G. Holt (Eds). 1994. *Bergey's Manual of systematic bacteriology, Vol.1*. Williams & Wilkins, Baltimore/London.

Lelliott, R. A. and D. E. Stead. 1987. *Methods for the diagnosis of bacterial diseases of plants*.

Blackwell Scientific Publications, Oxford, London, Edinburgh.

Waller, J. M., J. M. Lenne and S. J. Waller. 2002. *Plant pathogists pocketbook, 3rd Edition*. CAB International, Wallingford Oxon OX10 8DE, UK.

Williams, P., J. Ketley and G. Salmond (Eds). 1998. *Methods in Microbiology, Volume 27: Bacterial Pathogenesis*. ACADEMIC PRESS, San Diego London Boston, New York Sydney Tokyo Toronto

---

### 7.4. Periodicals, websites, ..... etc.

---

- Journal of plant disease
  - Journal of phytopathology
  -
- 

#### Course coordinator:

Prof. Dr Sahar Gamal El Deen

Fac. of Agriculture

Suez Canal University

#### Head of Department:

Prof. Dr.