Assiut University

Faculty of Computers & Information

# Bioinformatics PhD Program









Assiut University Faculty of Computers & Information Quality Assurance Unit



# Bioinformatics Ph.D. Program

## **Table of Contents**

Program Specifications	2
Courses Specifications	8
Program Matrix	10

Program Specifications



Assiut University Faculty of Computers & Information Quality Assurance Unit



# Bioinformatics Ph.D. Program Specifications

#### A. Basic Information

- 1. Program Title: Ph.D. in Computers and Information (Bioinformatics)
- 2. **Program Type:** Single
- 3. Faculty (Faculties): Faculty of Computers and Information
- 4. Department: Information Systems
- 5. Assistant Coordinator:
- 6. Coordinator: Prof. Dr. Taysir Hassan A. Soliman
- 7. Last date of program specifications approval: 1/9/2021

#### **B. Professional Information**

#### 1. Program Aims and Objectives

Successfully completing this program will contribute to some certain graduate attributes. Specifically, a graduate of Computers and Information (Bioinformatics) Ph. D. Program should be able to:

- I. Master scientific research basics and methodologies.
- II. Work continuously to add knowledge in bioinformatics.
- III. Apply analytical and criticizing methodologies in bioinformatics and other related domains.
- IV. Examine the social, cultural, economic, historical, legal, and political contexts in which information systems are employed, both to inform the design of such systems and to understand their impact on individuals, social groups, and institutions.
- V. Develop critical social evaluations.
- VI. Merge the specialized knowledge with other disciplines and indicate relations between them.
- VII. Recognize current problems and recent theories in bioinformatics and its impact on organizations.
- VIII. Determine professional problems and find innovative solutions for them.
- IX. Master professional skills in bioinformatics.
- X. Develop new tools, methodologies, and techniques for practicing the profession.
- XI. Communicate effectively at work and lead team work at various professional contexts.
- XII. Take decisions from provided information.
- XIII. Utilize and develop available resources efficiently and discover new resources.
- XIV. Recognize his role in developing the society and preserve the environment.
- XV. Act with integrity, credibility and applying the rules of the profession.

- XVI. Adopt life-long self-learning and transfer his/her knowledge and experience to others.
- XVII. Develop and deploy proper data analysis tools to analyze biological data

#### 2. Intended Learning Outcomes (ILOs)

#### a. Knowledge and Understanding

After completing the Ph. D. program in Computers and Information (Bioinformatics), the graduate should be able to:

- a1. List theories, fundamentals, and current state-of-the-art in bioinformatics and related domains.
- a2. Describe scientific research fundamentals, methodologies, ethics, and its various tools.
- a3. Recognize ethical and legal principles for professional practice in bioinformatics
- a4. Deploy quality principles for professional practice in bioinformatics.
- a5. Assess related knowledge of professional bioinformatics practice effect on the social context.
- a6. Classify the impact of bioinformatics on individuals, social groups, and institutions.
- a7. Manage biological data

#### b. Intellectual Skills

On successful completion of this program, graduates should be able to:

- b1. Analyze, evaluate, and visualize biological data in a systematic way including data uploading, data organization, data pre-processing, data analysis, results summary and data analysis reporting
- b2. Solve specialized problems based on the available inputs.
- b3. Carry out new research studies in bioinformatics.
- b4. Write scientific papers in bioinformatics.
- b5. Assess risks in professional bioinformatics practices.
- b6. Describe critically the most commonly used computational approaches to processing genomic and other related data and their theoretical underpinnings
- b7. Take professional decisions in different scenarios related to bioinformatics.
- b8. Create and innovate.
- b9. Talk and discuss based on proofs and evidences.
- b10. Perform basic and advanced analyses on large-scale biological data

#### c. Professional and Practical Skills

On successful completion of this program, graduates should be able to:

- c1. Master basic and modern professional skills in bioinformatics.
- c2. Write and evaluate professional reports related to bioinformatics.
- c3. Evaluate and develop current methods and tools in bioinformatics.
- c4. Use technological tools to serve the professional bioinformatics practice.
- c5. Plan to develop the professional bioinformatics practice and the performance of the others.
- c6. Evaluate the impact of bioinformatics on the society.
- c7. Apply significance and evidence-based bioinformatics problems.

#### d. General and Transferable Skills

On successful completion of this program, graduates should be able to:

- d1. Communicate efficiently by different means.
- d2. Use the information technology to develop the professional practice.
- d3. Educate the others and assess their performance.
- d4. Deploy a self-assessment and practice long-life learning.
- d5. Deploy different recourses to obtain information and knowledge.
- d6. Work in a team and lead work teams.
- d7. Manage scientific meeting with the ability to manage time.

#### 3. Academic Standards

The academic standards invoked in this specification are driven from:

- Generic the standards in the "Guide of Academic Standards for Graduate Programs" published by the National Authority for Quality Assurance & Accreditation (NAQAAE) on March 2009.
- Ph.D. in Exter University, UK.
- o Ph.D. in information sciences, Cornell University, USA.

#### 4. Curriculum Structure and Contents

- **4a.** Program duration: at least 2 years.
- **4b.** Program structure
  - No. of hours per week: Lectures (4), Lab./Tut. (0), Total (4)
  - No. of credit hours: courses (12), seminar (2), research papers (4), thesis (30)
  - Field Training: Not compulsory
  - Program Levels (in credit-hours system): 48 hours

#### 5. Program Courses

Course Code / No	Course Title	Course Title No. of hours No View No		Year	Semester	Achieved ILOs		
110.			Lect Lab		Exer			
	Elective Course 1	3	2	_	_	1 <sup>st</sup>	1 <sup>st</sup> + 2 <sup>nd</sup>	a1, a2-a5, b1, b2, b3, b5, b7, b8, b9, c1, c3, c4, d1, d2, d3, d5, d7
	Elective Course 2	3	2	_	_	1 <sup>st</sup>	1 <sup>st</sup> + 2 <sup>nd</sup>	a1, a2, a6, a7, b1, b2, b4, b5, b8-b10, c1, c3, c4, c7 d1, d2-d7

#### **5a.** Elective Courses

Course Code / No.	Course Title	Units No	No Lect	No. of hou /week Lect Lab		Year	Semester	Achieved ILOs
	Elective Course 3	3	2	_	_	1 <sup>st</sup>	1 <sup>st</sup> + 2 <sup>nd</sup>	a1, a2, a4, a6, a7, b1, b2, b5, b7, b6, b9, c1-c5, d1- d7
	Elective Course 4	4	2	_	_	1st	1 <sup>st</sup> + 2 <sup>nd</sup>	a1, a2, a4, a5, b1, b2, b4, b7, b9, b10, c1, c3, c4, c6, c7, d1, d2, d5, d7
TOTAL		12	8	-	-			·

Elective Cours	es
Course Code	Course Title
BNF700	Biological Networks
BNF701	Advanced Topics in Computational Genomics
BNF702	Biomedical Informatics
BNF703	Research Opportunities in Bioinformatics
BNF704	Seminars in Bioinformatics II
IS700	Advanced Big Data Analytics
IS701	Inference and Representation for Data Science
CS701	Advanced Artificial Intelligence
CS711	Advanced Topics in Machine Learning

#### 5b. Seminar

Course Code /	Course Title	Units No	No. o /weel	f hours k		Year	Semester	Achieved ILOs
NO.			Lect	Lab	Exer			
	Seminar	2	2	_	_	1st	2nd	a1, a2, a3, a5, a6, a7, b1, b3, b4, b5, b6, b8, c1, c2, c3, c6, c7, d2- d9
TOTAL	<u>.</u>	2	2	-	-		-	<u>.</u>

#### 5c. Research papers

Course Code /	Course Title	Units No	No	o. of ho /week	urs	Year	Semester	Achieved ILOs
INO.			Lect	Lab	Exer			
	research papers	4	-			1 <sup>st</sup>	2 <sup>nd</sup>	a1, a2, a3, a5, a6, a7, a8, b1, b3, b4, b5, b6, b8, c1-c7, d2-d9
TOTAL		4	-					

#### 5d. Ph. D. Thesis

No.	Title	Units No	Year	Semester	Achieved ILOs
1	Ph. D. Thesis	30	2nd	1st + 2 <sup>nd</sup>	a1, a2, a3, a4, a5, a6, a7,b1, b2, b3, b4, b6, b7, b8, b9, c1, c2, c3, c4, c5, d1, d2, d4, d5

#### 6. Contents of Courses

Syllabus: See below

#### 7. Program Admission Requirements

High score in secondary school education certificate in (mathematic section).

#### 8. Regulations for progression and program completion

Please, refer to faculty bylaw (curriculum of undergraduate programs), 2004, pages 4-5.

#### 9. Student Assessment (Methods and rules for student assessment)

Method (tool)	Intended leaning outcomes assessed
1- Written examinations	Knowledge and Understanding - Intellectual Skills - Professional Skills - General Skills
2- Oral examination	Knowledge and Understanding - Intellectual Skills - General Skills
3- Thesis	Knowledge and Understanding - Intellectual Skills - Professional Skills - General Skills

#### **10. Program Evaluation**

Evaluator	Tool	Sample
1- Senior students		
2- Alumni	Questionnaire	
3- Stakeholders		
4-External Evaluator(s) (External Examiner(s))	Report	
5- Other		

**Program Coordinator:** Prof. Dr. Taysir Hassan A. Soliman **Signature: Date:** 1/9/2021

**Department Head:** Prof. Dr. Taysir Hassan A. Soliman **Signature: Date:** 1/9/2021

**Approved by the Dean:** Prof. Dr. Taysir Hassan A. Soliman **Signature: Date:** 1/9/2021

Program Matrix

Assiut University

Faculty of Computers & Information

Department of Information Systems

Quality Assurance Unit



## Bioinformatics PH.D. Program Matrix

Prog ILC	ram Os	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	b4	b5	b6	b7	b8	b9	b1 0	c1	c2	c3	c4	c5	с6	с7	d1	d2	d3	d4	d5	d6	d7
	EL1	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$				$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$
	EL2	$\checkmark$	$\checkmark$				$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$			$\checkmark$							
Co	EL3	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$						
ur	EL4	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$		$\checkmark$			$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$		$\checkmark$
se s	Sem inar	$\checkmark$	~	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	~	$\checkmark$	$\checkmark$		$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
an d Th esi	Rese arch Pap ers	√	~	~		~	~	~	~		~	~	~	~		~			~	~	~	~	~	~	~	√	~	~	~	~	~	~
S	Ph. D. The sis	√	~	~	~	~	$\checkmark$	~	~	$\checkmark$	~	~		~	~	~	~		~	~	~	~	~			$\checkmark$	$\checkmark$		~	~		

