ASSIUT UNIVERSITY

Faculty of Computers and Information

Department of Computer Science

Computer Science

PhD Program 2021-2022

Assiut University

Faculty of Computers & Information

Computer Science PhD Program

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Program Specifications 2021-2022

A. Basic Information

1. **Program Title:** Ph.D. in Computers and Information (Computer Science)
2. **Program Type:** Single
3. **Faculty (Faculties):** Faculty of Computers and Information
4. **Department:** Computer Science
5. **Assistant Coordinator:** Prof. Dr. Khaled F. Hussain
6. **Coordinator:** Prof. Dr. Khaled F. Hussain
7. **Last date of program specifications approval:** 21/8/2022

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 (Computer Science) Ph. D. Program should be able to:

I. Master scientific research basics and methodologies.
II. Work continuously to add knowledge in information systems.
III. Apply analytical and criticizing methodologies in computer science and other related domains.
IV. Merge the specialized knowledge with other and indicate relations between them.
V. Be deeply aware of current problems and recent theories in computer science.
VI. Determine professional problems and find innovative solutions for them.
VII. Master professional skills in computer science.
VIII. Develop new tools, methodologies, and techniques for practicing the profession.
IX. Communicate effectively at work and lead team work at various professional contexts.
X. Take decisions from provided information.
XI. Utilize and develop available resources efficiently and discover new resources.
XII. Be aware of his role in developing the society and preserve the environment.
XIII. Act with integrity, credibility and applying the rules of the profession.
XIV. Adopt life-long self-learning and transfer his/her knowledge and experience to others.

2. Intended Learning Outcomes (ILOs)

a. Knowledge and Understanding

After completing the Ph. D. program in Computers and Information (Ccomputer Science), the graduate should be able to know and understand the following:

a1. Theories, fundamentals, and current state-of-the-art in computer science domain and their related domains.
a2. Scientific research fundamentals, methodologies, ethics, and its various tools.
a3. Ethical and legal principles for professional practice in computer science.
a4. Quality principles for professional practice in computer science.
a5. Related knowledge of professional practice effect on the environment and methods to develop and preserve it.

b. Intellectual Skills

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

b1. Analyze and evaluate the information in the domain of computer science and take references and induce from them.
b2. Solve specialized problems based on the available inputs.
b3. Carry out new research studies in computer science.
b4. Write scientific papers in computer science.
b5. Assess risks in professional computer science practices.
b6. Plan to develop the performance in computer science.
b7. Take professional decisions in different scenarios related to computer science.
b8. Create and innovate.
b9. Talk and discuss based on proofs and evidences.
b10. Recognize the need for, and show an ability for, dealing with constantly changing technology and continuing professional development.
b11. Generate and apply innovative solutions to solve problems based on reasoned rationale.

c. Professional and Practical Skills

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

c1. Master basic and modern professional skills in computer science.
c2. Write and evaluate professional reports related to computer science.
c3. Evaluate and develop current methods and tools in computer science.
c4. Use technological tools to serve the professional computer science practice.
c5. Plan to develop the professional computer science practice and the performance of the others.
c6. Propose and design possible alternative directions for further work.
c7. Analyze, evaluate and synthesize research and apply theoretical ideas to practical settings.

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. Have a self-assessment and long-life learning.
d5. Use different recourses to obtain information and knowledge.
d6. Work productively in team or collaborative settings to achieve common goals or purposes including the ability to lead a team.
d7. Manage scientific meeting with the ability to manage time.
d8. Participate within the professional, legal and ethical framework within which they would be expected to operate as professionals within the IT industry.

d9. Effectively present ideas, designs and solutions in a logical framework in a variety of forms with proper language structure and mechanics, and to produce appropriate written documentation.

d10. Make use of the qualities and transferable skills necessary for employment requiring concerning the exercise of initiative and personal responsibility, and decision making in complex and unpredictable situations.

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.

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: Compulsory (6), Elective (12)
- Field Training: Not compulsory

5. Program Courses

5a. Elective Courses

Course Code / No.	Course Title	Units No	No. of hours / week			Year	Semester	Achieved ILOs
			Lect.	Lab	Exer.			
1	Elective Course 1	3	2	–	–	1st	1st	a1, a2, a4, a5, b1, b2, b5, b7, b9, b11, c1, c3, c4, c6, d1, d2, d5, d9
2	Elective Course 2	3	2	–	–	1st	1st	a1, a2, a5, b1, b2, b9-b11, c1, c4, c6, c7, d1, d2, d5, d9
3	Elective Course 3	3	2			1st	2nd	a1, a2, a5, b1, b2, b9-b11, c1, c4, c6, c7, d1, d2, d5, d9
4	Elective Course 4	3	2			1st	2nd	a1, a2, a5, b1, b2, b9, b11, c1, c4, c6, c7, d1, d2, d5, d9
T O T A L		12	8	–	–			

Elective Courses	
Course Code	Course Title
CS700	Advanced Topics in Distributed Computing
CS701	Advanced Artificial Intelligence
CS702	Arabic Language Processing
CS703	Advanced compiler constructions
CS704	Computational Geometry
CS705	Quantum Information Processing
CS706	Real-time Graphics Programming for Games
CS707	Applied Cloud Computing
CS708	Advanced Cryptography
CS709	Selected Topics in Computer Science I
CS710	Selected Topics in Computer Science II
IT 700	Advanced Topics in Computer Networks
IT 701	Advanced Network Security Topics
IT 703	Network Performance Analysis and Simulations
IT 704	Internet of Things (IoT)
MM 701	Augmented reality systems
BNF704	Seminars in Bioinformatics II

5b. Seminar

No.	Title	Units No	Year	Semester	Achieved ILOs
1	Seminar	2	1st	2nd	a1, a2, a3, a4, a5, b1, b2, b5-b11, c1, c2, c3, c4, c5, c6, c7, d1, d2, d3, d4, d5, d6, d7, d8, d9

5c. Research papers

No.	Title	Units No	Year	Semester	Achieved ILOs
1	Research papers	4	1st	2nd	a1, a2, a3, a4, a5, b1-b11, c1, c2, c3, c4, c5, c6, c7, d1, d2, d3, d4, d5, d6, d7, d8, d9

5d. Ph. D. Thesis

No.	Title	Units No	Year	Semester	Achieved ILOs
1	Ph. D. Thesis	30	2nd	1st + 2nd	a1- a5, b1 -b11, c1-c7, d1, d2, d4-d10

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), 2019.

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. Khaled F. Hussain

Signature:
Date: 21/8/2022

Department Head: Prof. Dr. Khaled F. Hussain

Signature:
Date: 21/8/2022

Approved by the Dean: Prof. Dr. Taiseer Hassan Abdel-Hamid Sulaiman

Signature:
Date: 21/8/2022

Program Matrices

CS PhD Program Matrices

The main description of a Computer Science Program can be summarized in different types of matrices. These matrices are:

1. **Academic Standards Matrix**
   This matrix shows theILOsinvoked in CS Program Specifications and those existing in NARS and the corresponding between them.
2. **Program Matrix I (Courses – NARS General)**
   This matrix shows how CS Program Courses can cover the NARS general ILOs.
3. **Program Matrix II (Courses – NARS Special)**
   This matrix shows how CS Program Courses can cover the NARS special ILOs.
4. **Program Matrix III (Courses – Knowledge and Understanding Skills)**
   This matrix shows how CS Program Courses can cover Knowledge and Understanding Skills invoked in CS Program Specifications.
5. **Program Matrix IV (Courses – Intellectual Skills)**
   This matrix shows how CS Program Courses can cover Intellectual Skills invoked in CS Program Specifications.
6. **Program Matrix V (Courses – Professional and Practical Skills)**
   This matrix shows how CS Program Courses can cover Professional and Practical Skills invoked in CS Program Specifications.
7. **Program Matrix VI (Courses – Transferable Skills)**
   This matrix shows how CS Program Courses can cover Transferable Skills invoked in CS Program Specifications.

CS PhD Program Matrices

Program ILOs		a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	c1	c2	c3	c4	c5	c6	c7	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10
Courses and Thesis	EL1	✓	✓		✓	✓	✓	✓			✓		✓		✓		✓	✓		✓	✓		✓		✓	✓			✓				✓	
	EL2	✓	✓		✓	✓	✓	✓			✓		✓		✓		✓	✓		✓	✓		✓		✓	✓			✓				✓	
	EL3	✓	✓		✓	✓	✓	✓			✓		✓		✓	✓	✓	✓		✓	✓		✓	✓	✓	✓			✓				✓	
	EL4	✓	✓		✓	✓	✓	✓			✓		✓		✓	✓	✓	✓		✓	✓		✓	✓	✓	✓			✓				✓	
	Seminar	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Research papers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Thesis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓

Program Report 2023- 2024

CS Graduate Program Report

1. Basic Information

1. **Program Name: Ph.D**. in Computers and Information (Computer Science)
2. **Program Type:**

Single	✓	Double		Multiple	

3. **Department:** Computer Science
4. **Coordinator:** Prof. Dr. Khaled F. Hussain
5. **Year of operation:** 2023-2024

6. Statistics

7. **No. of students starting the program: 2**
8. **Percentage of students passing in preparatory year:**

Course	%
Advanced Artificial Intelligence	100%
Selected Topics in Computer Science I	100%
Arabic Language Processing	100%
Selected Topics in Computer Science II	100%

- **No. of students completing the program and as a percentage of those who started**

The percentage of students completing to those who started	0%

- **Professional Information**
- **Achievement of program intended learning outcomes**

Program ILOs		a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	c1	c2	c3	c4	c5	c6	c7	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10
Courses and Thesis	EL1	✓	✓		✓	✓	✓	✓			✓		✓		✓		✓	✓		✓	✓		✓		✓	✓			✓				✓	
	EL2	✓	✓		✓	✓	✓	✓			✓		✓		✓		✓	✓		✓	✓		✓		✓	✓			✓				✓	
	EL3	✓	✓		✓	✓	✓	✓			✓		✓		✓	✓	✓	✓		✓	✓		✓	✓	✓	✓			✓				✓	
	EL4	✓	✓		✓	✓	✓	✓			✓		✓		✓	✓	✓	✓		✓	✓		✓	✓	✓	✓			✓				✓	
	Seminar	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Research papers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Thesis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓

- **Achievement of program aims**

Based on the external and external evaluators' comments, the courses offered during the program levels could achieve the program aims.

- **Assessment methods**

Different assessment methods were used during the levels of the program. These methods are:

a. Preparatory Year :

- Written examination (70%)
- Year Work (30%)

b. Thesis Defense

Based on the external and internal evaluators' comments, these assessment methods are appropriate to assess student levels of achievement.

- Number of Students who finished their Ph.D: 0

- **Quality of Learning Opportunities**

- **Quality of teaching and learning**

Based on the meeting with some stakeholders, the quality of the teaching and learning process which has been carried out in IS program is good. Students' opinions from all program levels have also supported this good level the teaching and learning process.

- **Effectiveness of student support systems**

Students are supported through different systems which are summarized as follows.

- **Office Hours**: Academic extra office hours to meet students and reply their questions and queries.
- **Student Social Networks**: Academic and assistant staff interact with students through different social networks (Facebook, Twitter, LinkedIn, …)
- **Honor Prizes**: The University offers best thesis in both M.SC and Ph.D based on university competition.
- **Researches:** Publications in International Journals will be financially honored from the university with impact factor**.**

- **Learning resources**
- **No. and ratio of faculty members and their assistants to students 3:2**

3a. Matching of faculty members' specialization to program needs.

Available: ☑ May be: ☐ Unavailable: ☐

(Why) …..

3b. Availability and adequacy of program handbook

Available: ☐ May be: ☑ Unavailable: ☐

(Why) More copies of the textbooks are needed.

3c. Adequacy of library facilities.

Available: ☑ May be: ☐ Unavailable: ☐

(Why) …..

3d. Adequacy of laboratories

Available: ☑ May be: ☐ Unavailable: ☐

(Why) …..

3e. Adequacy of computer facilities

Available: ☑ May be: ☐ Unavailable: ☐

(Why) …..

3f. Adequacy of field/practical training resources

Available: ☐ May be: ☑ Unavailable: ☐

(Why) The program should offer more practical courses related to the market.

3g. Adequacy of any other program needs

Available: ☑ May be: ☐ Unavailable: ☐

(Why) …..

1. Quality management

4a. Availability of regular evaluation and revision system for the program

Available: ☑ May be: ☐ Unavailable: ☐

(Why) …..

4b. Effectiveness of the system

Efficient: ☑ May be: ☐ Inefficient: ☐

(Why) …..

4c. Effectiveness of Faculty and University laws and regulations for progression and completion

Efficient: ☑ Inefficient: ☐

(Why) …..

4d. Effectiveness of program external evaluation system:

i. External evaluators

Efficient: ☑ May be: ☐ Inefficient: ☐

(Why) …..…..…..…..…..…..…..…..…..…..…..…..…..…..…..…..…..…..…..

ii. Students

Efficient: ☑ May be: ☐ Inefficient: ☐

(Why) …..…..…..…..…..…..…..…..…..…..…..…..…..…..…..…..…..…..…..

iii. Other stakeholders

Efficient: ☐ May be: ☑ Inefficient: ☐

(Why) The response of the stakeholders is still limited since most of the program graduates work in Cairo.

4e. Faculty response to student and external evaluations

- **For students 'comments :**
  1- Increase Self – Learning
  2- Motivate Students More

External Evaluators' Comments	Reasons
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- **Progress of previous year's action plan**

Actions	Person Responsible	Completion		Reasons for non-completion
		Yes	No	
-	-	-	-	-

- **Action plan**

Actions	Person Responsible	Completion Date
-	-	-

Program Coordinator Prof. Dr. Khaled F. Hussain

Signature:

Date: 21/8/2022

Department Head: Prof. Dr. Khaled F. Hussain

Signature:

Date: 21/8/2022

Program Report

Course Specifications and Reports 2023-2024

Advanced Artificial Intelligence

CS701

Course Specifications

Relevant program	Ph.D. in Computers and Information (Computer Science)
Department offers the program	Computer Science
Department offers the course	Computer Science
Academic year	1st Year
Date of specification approval	19/8/2023

A. Basic Information

1. **Course Title:** Advanced Artificial Intelligence
2. **Course Code:** CS701
3. **Course hours per week:**

Lecture	Tutorial / Practical	Total
3	–	3

B. Professional Information

1. Overall aims of the course

Upon completing this course the student will have learned, through appropriate classroom and laboratory experiences, the following.

- Explore advanced AI topics like deep learning, reinforcement learning, and neural networks in depth.
- Expose students to cutting-edge AI developments and research trends, promoting critical thinking and contribution to the field.
- Equip students with the skills to tackle sophisticated problems in various domains (e.g., natural language processing, computer vision, robotics) using advanced AI methods.

2. Intended Learning Outcomes (ILOs) of the course

a. Knowledge and Understanding

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

a1. Theories, fundamentals, and current state-of-the-art in Computer Science domain and their related domains.
a2. Scientific research fundamentals, methodologies, ethics, and its various tools.
a3. Related knowledge of professional practice effect on the environment and methods to develop and preserve it.

a4. Quality principles for professional practice in Computer Science.
a5. Learning the relations among software product, process and project in quality assurance and management.

b. Intellectual Skills

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

b1. Analyze and evaluate the information in the domain of Computer Science and take references and induce from them.
b2. Solve specialized problems based on the available inputs.
b3. Talk and discuss based on proofs and evidences.
b4. Assess risks in professional practices.
b5. Take professional decisions in different scenarios.
b6. Generate and apply innovative solutions to solve problems based on reasoned rationale.

c. Professional and Practical Skills

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

c1. Master basic and modern professional skills in Computer Science.
c2. Use technological tools to serve the professional practice.
c3. Evaluate and develop current methods and tools in Computer Science.
c4. Applying good practices for managing the development of quality software.
c5. Propose and design possible alternative directions for further work.

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. Use different recourses to obtain information and knowledge.
d4. Effectively make ideas, designs and solutions in a logical framework in a variety of forms with proper language structure and mechanics, and to produce appropriate written documentation.

3. Contents

No	Topic taught	No. of hours		ILOs
		Lecture	Tut/Prac	
1	This course provides an in-depth exploration of advanced AI topics beyond basic introductory knowledge.	12	–	a1-a5, b1-b5, c1-c4, d1-d4
2	Transformers and attention mechanisms, transfer learning and pre-trained models, and reinforcement learning.	15	–	a1-a5, b1-b6, c1-c5, d1-d4
3	Language models, object detection, image segmentation, and generative techniques for vision.	15	–	a1-a5, b1-b6, c1-c5, d1-d4

4. Teaching and Learning Methods

4a. Lectures

4b. Tutorial Exercises

4c. Workshops

4d. Projects

5. Student Assessment

5a. Tools

Final Exam	To measure knowledge, understanding, intellectual professional and general skills.
Projects	To measure professional and general skills

5b. Time Schedule

Assessment	Week No
Final Exam	15

5c. Grading System

Assessment	**Grade %**
Final Exam	70%
Year Work	30%

5d. Formative Assessment

Regular quizzes distributed along the whole semester.

6. List of References

6a. Course Notes

- Short course notes available at the course homepage.

6b. Required Books (Textbooks)

- Shi, Zhongzhi. *Advanced artificial intelligence*. Vol. 4. World Scientific, 2019.

6c. Recommended Books

- Ian Goodfellow, Yoshua Bengio, and Aaron Courville: Deep Learning, Publishing, 2016.

6d. Web Sites

- Course homepage is accessed from the FCI website: http://www.aun.edu.eg/Courses/

7. Facilities Required for Teaching and Learning

- A lecture hall equipped with projectors and computers.
- Labs equipped with computers and Internet facilities.
- A library.

Course Coordinator: Prof. Dr. Marghany Hassan Mohamed

Signature:

Date: 21/8/2023

Department Head: Prof. Dr. Khaled F. Hussain

Signature:

Date: 21/8/2023

Course Matrix

Course Name | Advanced Artificial Intelligence **Course Code** CS701

Course Aims	Course Content	Teaching Weeks	ILOs				Teaching and Learning Methods							Assessment Tools	Criteria
			a's	b's	c's	d's	Lectures	Tutorial Exercises	Practical Exercises	Workshops	Projects	Case Study	Data Collections	Final Exam	
• Explore advanced AI topics like deep learning, reinforcement learning, and neural networks in depth. • Expose students to cutting-edge AI developments and research trends, promoting critical thinking and contribution to the field. • Equip students with the skills to tackle sophisticated problems in various domains (e.g., natural language processing, computer vision, robotics) using advanced AI methods.	This course provides an in-depth exploration of advanced AI topics beyond basic introductory knowledge.	1-4	1-5	1-5	1-4	1-4	✓	✓						✓	
	Transformers and attention mechanisms, transfer learning and pre-trained models, and reinforcement learning.	5-9	1-5	1-6	1-5	1-4	✓	✓				✓		✓	
	Language models, object detection, image segmentation, and generative techniques for vision.	10-14	1-5	1-6	1-5	1-4	✓	✓			✓	✓		✓	

Course Coordinator | Prof. Dr. Marghany Hassan Mohamed Department Head | Prof. Dr. Khaled F. Hussain

Signature |

Signature |

Course Report

• Basic Information

- **Course Title:** Advanced Artificial Intelligence
- **Course Code:** CS701
- **Course hours per week:**

Lecture	Tutorial / Practical	Total
3	-	3

- **Names of lecturers contributing to the delivery of the course:**
  - **Course Coordinator:** Prof. Dr. Marghany Hassan Mohamed

• Statistical Information

No. of students attending the course: No. 2 % 100

No. of students completing the course: No. 2 % 100

Results:

Passed: No. 2 % 100 Failed: No. 0 % 0

Grading of successful students:

Excellent: No. 0 % 0 Very Good: No. 2 % 100

Good: No. 0 % 0 Pass: No. 0 % 0

• Professional Information

• Course Teaching

No	Topic taught	No. of hours		ILOs
		Lecture	Tut/Prac	
1	This course provides an in-depth exploration of advanced AI topics beyond basic introductory knowledge.	12	-	a1-a5, b1-b5, c1-c4, d1-d4
2	Transformers and attention mechanisms, transfer learning and pre-trained models, and	15	-	a1-a5, b1-b6, c1-c5, d1-d4

	reinforcement learning.			
3	Language models, object detection, image segmentation, and generative techniques for vision.	15	-	a1-a5, b1-b6, c1-c5, d1-d4

Topics taught as a percentage of the content specified:

> 90 % [ ] 70-90 % [✓] <70% [ ]

Reasons in detail for not teaching any topic:

If any topics were taught which are not specified, give reasons in detail:

No.	Topics	Reasons
	–	–

- ## Teaching and Learning Methods

Lectures:	✓
Practical training / Laboratory:	
Seminar / Workshop:	✓
Class activity:	✓
Case study:	
Assignments/Homework:	✓

If teaching and learning methods were used other than those specified, list and give reasons:

Method	Reasons

- ## Student Assessment

Assessment	Grade %
Final Exam	70%
Year Work	30%

Members of examination committee:

- Prof. Dr. Marghany Hassan Mohamed
- Prof. Dr. Khaled F. Hussain

Role of external evaluator:

- To verify that academic standards are appropriate for the award
- To verify that the assessment methods fairly assess the range of specified Intended Learning Outcomes
- To review and evaluate the course specifications and reports and provide a review report about them.

- ## Facilities and Teaching Materials

Totally adequate	✓
Adequate to some extent	
Inadequate	

List any inadequacies:

- No inadequacy.

- ## Administrative Constraints

List any difficulties encountered:

- No difficulty.

- ## Student Evaluation of the Course

No	Evaluation Items	Agree	Agree to some extent	Disagree
1	**Lecturer**	-	-	-
2	**Course**	-	-	-
3	**Facilities**	-	-	-
4	**Teaching Assistants**	-	-	-

Criticisms	**Response of course team**
-	-

- ## Comments from external evaluator(s)

Comments	**Response of course team**
-	-

- ## Course Enhancement

Progress on actions identified in the previous year's action plan:

Actions	**Completion**		**Reasons for non-completion**
	Yes	**No**	
Integrate case studies to analyze real-world AI systems and their impacts.	✓		-

- ## Action plan for academic year 2024 – 2025

Actions Required	**Completion Date**	**Person Responsible**
Choose updated textbooks, research papers, and online resources.		
Create tasks where students apply AI techniques to complex problems, including both individual and group projects.		

Course Coordinator: Prof. Dr. Marghany Hassan Mohamed

Signature:

Date: 21/8/2024

Selected Topics in Computer Science I

CS709

Course Specifications

Relevant program	Ph.D. in Computers and Information (Computer Science)
Department offers the program	Computer Science
Department offers the course	Computer Science
Academic year	1st Year
Date of specification approval	19/8/2023

A. Basic Information

1. **Course Title:** Selected Topics in Computer Science I
2. **Course Code:** CS709
3. **Course hours per week:**

Lecture	Tutorial / Practical	Total
3	–	3

B. Professional Information

1. Overall aims of the course

Upon completing this course the student will have learned, through appropriate classroom and laboratory experiences, the following.

- Provide students with an overview of the latest research areas in computer science.
- Teach students about the methodologies and techniques used in contemporary research.

2. Intended Learning Outcomes (ILOs) of the course

a. Knowledge and Understanding

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

a1. Theories, fundamentals, and current state-of-the-art in Computer Science domain and their related domains.
a2. Scientific research fundamentals, methodologies, ethics, and its various tools.
a3. Related knowledge of professional practice effect on the environment and methods to develop and preserve it.
a4. Learning the real-world aspects of object orientation by putting the concepts into practice.

b. Intellectual Skills

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

b1. Analyze and evaluate the information in the domain of Computer Science and take references and induce from them.
b2. Solve specialized problems based on the available inputs.
b3. Talk and discuss based on proofs and evidences.
b4. Recognize the need for, and show an ability for, dealing with constantly changing technology and continuing professional development.
b5. Generate and apply innovative solutions to solve problems based on reasoned rationale.

c. Professional and Practical Skills

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

c1. Master basic and modern professional skills in Computer Science.
c2. Use technological tools to serve the professional practice.
c3. Enhancing programming foundation by studying advanced concepts behind object orientation.
c4. Propose and design possible alternative directions for further work.
c5. Analyze, evaluate and synthesize research and apply theoretical ideas to practical settings.

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. Use different recourses to obtain information and knowledge.
d4. Effectively make ideas, designs and solutions in a logical framework in a variety of forms with proper language structure and mechanics, and to produce appropriate written documentation.

3. Contents

No	Topic taught	No. of hours		ILOs
		Lecture	Tut/Prac	
1	The orthography in the Arabic script and its application	6	–	a1-a4, b1-b3, b5, c1-c5, d1-d4
2	Inflectional and Derivational Morphology in Arabic Language and related problems and applications	12	–	a1-a4, b1-b3, b5, c1-c5, d1-d4
3	Morphology ambiguity in Arabic language	12	–	a1-a4, b1-b5, c1-c4, d1-d4
4	NLP techniques for Arabic dialects LLMs for Arabic Language	12	–	a1-a4, b1-b5, c1-c4, d1-d4

4. Teaching and Learning Methods

4a. Lectures
4b. Tutorial Exercises
4c. Workshops
4d. Projects

5. Student Assessment

5a. Tools

Final Exam	To measure knowledge, understanding, intellectual professional and general skills.
Projects	To measure professional and general skills

5b. Time Schedule

Assessment	Week No
Final Exam	15

5c. Grading System

Assessment	**Grade %**
Final Exam	70%
Year Work	30%

5d. Formative Assessment

Regular quizzes distributed along the whole semester.

6. List of References

6a. Course Notes

- Short course notes available at the course homepage.

6b. Required Books (Textbooks)

- Habash, Nizar Y. *Introduction to Arabic natural language processing*. Morgan & Claypool Publishers, 2010

6c. Recommended Books

- Lachkar, Abdelmonaime, et al., eds. Arabic Language Processing: From Theory to Practice: 6th International Conference, ICALP 2017, Fez, Morocco, October 11–12, 2017, Proceedings. Vol. 782. Springer, 2018.

6d. Web Sites

- Course homepage is accessed from the FCI website: http://www.aun.edu.eg/Courses/

7. Facilities Required for Teaching and Learning

- A lecture hall equipped with projectors and computers.
- Labs equipped with computers and Internet facilities.
- A library.

Course Coordinator: Prof. Dr. Abdel-Rahman Hedar

Signature:

Date: 21/8/2023

Department Head: Prof. Dr. Khaled F. Hussain

Signature:

Date: 21/8/2023

Course Matrix

Course Name	Selected Topics in Computer Science I	**Course Code**	CS709

Course Aims	**Course Content**	**Teaching Weeks**	**ILOs**				**Teaching and Learning Methods**							**Assessment Tools**	**Criteria**
			a's	**b's**	**c's**	**d's**	**Lectures**	**Tutorial Exercises**	**Practical Exercises**	**Workshops**	**Projects**	**Case Study**	**Data Collections**	**Final Exam**	
• Provide students with an overview of the latest research areas in computer science. • Teach students about the methodologies and techniques used in contemporary research.	The orthography in the Arabic script and its application	1-2	1-4	1-3, 5	1-5	1-4	✓	✓						✓	
	Inflectional and Derivational Morphology in Arabic Language and related problems and applications	3-6	1-4	1-3, 5	1-5	1-4	✓	✓	✓			✓		✓	
	Morphology ambiguity in Arabic language	7-10	1-4	1-5	1-4	1-4	✓	✓			✓			✓	
	NLP techniques for Arabic dialects LLMs for Arabic Language	11-14	1-4	1-5	1-4	1-4	✓	✓			✓			✓	

Course Coordinator	Prof. Dr. Abdel-Rahman Hedar	Department Head	Prof. Dr. Khaled F. Hussain
Signature		Signature	

Course Report

Basic Information

- **Course Title:** Selected Topics in Computer Science I
- **Course Code:** CS709
- **Course hours per week:**

Lecture	Tutorial / Practical	Total
3	-	3

- **Names of lecturers contributing to the delivery of the course:**
  - **Course Coordinator:** Prof. Dr. Abdel-Rahman Hedar

Statistical Information

No. of students attending the course: No. 2 % 100

No. of students completing the course: No. 2 % 100

Results:

Passed: No. 2 % 100 Failed: No. 0 % 0

Grading of successful students:

Excellent: No. 2 % 100 Very Good: No. 0 % 0

Good: No. 0 % 0 Pass: No. 0 % 0

Professional Information

Course Teaching

No	Topic taught	No. of hours		ILOs
		Lecture	Tut/Prac	
1	The orthography in the Arabic script and its application	6	-	a1-a4, b1-b3, b5, c1-c5, d1-d4
2	Inflectional and Derivational	12	-	a1-a4, b1-b3, b5,

	Morphology in Arabic Language and related problems and applications			c1-c5, d1-d4
3	Morphology ambiguity in Arabic language	12	-	a1-a4, b1-b5, c1-c4, d1-d4
4	NLP techniques for Arabic dialects LLMs for Arabic Language	12	-	a1-a4, b1-b5, c1-c4, d1-d4

Topics taught as a percentage of the content specified:

> 90 % [ ] 70-90 % [✓] <70% [ ]

Reasons in detail for not teaching any topic:

If any topics were taught which are not specified, give reasons in detail:

No.	Topics	Reasons
	–	–

- ## Teaching and Learning Methods

Lectures: [✓]
Practical training / Laboratory: [ ]
Seminar / Workshop: [✓]
Class activity: [✓]
Case study: [ ]
Assignments/Homework: [✓]

If teaching and learning methods were used other than those specified, list and give reasons:

Method	Reasons

- ## Student Assessment

Assessment	Grade %
Final Exam	70%
Year Work	30%

Members of examination committee:

- Prof. Dr. Abdel-Rahman Hedar
- Dr. Mostafa Kamel Othman

Role of external evaluator:

- To verify that academic standards are appropriate for the award
- To verify that the assessment methods fairly assess the range of specified Intended Learning Outcomes
- To review and evaluate the course specifications and reports and provide a review report about them.

- ## Facilities and Teaching Materials

Totally adequate [✓]

Adequate to some extent	
Inadequate	

List any inadequacies:

- No inadequacy.

- ## Administrative Constraints

List any difficulties encountered:

- No difficulty.

- ## Student Evaluation of the Course

No	Evaluation Items	Agree	Agree to some extent	Disagree
1	**Lecturer**	-	-	-
2	**Course**	-	-	-
3	**Facilities**	-	-	-
4	**Teaching Assistants**	-	-	-

Criticisms	Response of course team
-	-

- ## Comments from external evaluator(s)

Comments	Response of course team
-	-

- ## Course Enhancement

Progress on actions identified in the previous year's action plan:

Actions	Completion		Reasons for non-completion
	Yes	No	
No Action	-	-	-

- ## Action plan for academic year 2024 – 2025

Actions Required	Completion Date	Person Responsible

Course Coordinator: Prof. Dr. Abdel-Rahman Hedar

Signature:

Date: 21/8/2024

Arabic Language Processing

CS702

Course Specifications

Relevant program	Ph. D. in Computers and Information (Computer Science)
Department offers the program	Computer Science
Department offers the course	Computer Science
Academic year	1st Year
Date of specification approval	19/8/2023

A. Basic Information

1. **Course Title:** Arabic Language Processing
2. **Course Code:** CS702
3. **Course hours per week:**

Lecture	Tutorial / Practical	Total
3	–	3

B. Professional Information

1. Overall aims of the course

Upon completing this course the student will have learned, through appropriate classroom and laboratory experiences, the following.

- The fundamental algorithms and mathematical models for natural language processing.
- Provide foundational knowledge of Arabic linguistics, including its phonology, morphology, syntax, and semantics.
- Address the challenges associated with the Arabic script, including handling diacritics and different orthographic forms.

2. Intended Learning Outcomes (ILOs) of the course

a. Knowledge and Understanding

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

a1. Theories, fundamentals, and current state-of-the-art in Computer Science domain and their related domains.
a2. Scientific research fundamentals, methodologies, ethics, and its various tools.
a3. Related knowledge of professional practice effect on the environment and methods to develop and preserve it.
a4. Quality principles for professional practice in Computer Science.

a5. Fault tolerance fundamentals, models and methodologies in distributed systems especially concerning protocols and network redundancy.

b. Intellectual Skills

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

b1. Analyze and evaluate the information in the domain of Computer Science and take references and induce from them.
b2. Solve specialized problems based on the available inputs.
b3. Talk and discuss based on proofs and evidences.
b4. Assess risks in professional practices.
b5. Take professional decisions in different scenarios.
b6. Recognize the need for, and show an ability for, dealing with constantly changing technology and continuing professional development.
b7. Generate and apply innovative solutions to solve problems based on reasoned rationale.

c. Professional and Practical Skills

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

c1. Master basic and modern professional skills in Computer Science.
c2. Use technological tools to serve the professional practice.
c3. Evaluate and develop current methods and tools in Computer Science.
c4. Apply the design principles of fault-tolerant software systems.
c5. Propose and design possible alternative directions for further work.
c6. Analyze, evaluate and synthesize research and apply theoretical ideas to practical settings.

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. Use different recourses to obtain information and knowledge.
d4. Effectively make ideas, designs and solutions in a logical framework in a variety of forms with proper language structure and mechanics, and to produce appropriate written documentation.

3. Contents

No	Topic taught	No. of hours		ILOs
		Lecture	Tut/Prac	
1	Regular Expressions, Finite State Automata, Context free grammars, Morphology and Phonology.	15	–	a1-a5, b1-b7, c1-c4, d1-d3
2	Word prediction, Language modeling, Named entity recognition, and parts of speech.	15	–	a1-a5, b1-b7, c1-c5, d1-d4
3	Arabic language processing, Machine translation, Sentiment Analysis and Text Classification.	12	–	a1-a5, b1-b7, c1-c4, c6, d1-d4

4. Teaching and Learning Methods

4a. Lectures

4b. Tutorial Exercises

4c. Workshops

4d. Projects

5. Student Assessment

5a. Tools

Final Exam	To measure knowledge, understanding, intellectual professional and general skills.
Projects	To measure professional and general skills

5b. Time Schedule

Assessment	Week No
Final Exam	15

5c. Grading System

Assessment	**Grade %**
Final Exam	70%
Year Work	30%

5d. Formative Assessment

Regular quizzes distributed along the whole semester.

6. List of References

6a. Course Notes

- Short course notes available at the course homepage.

6b. Required Books (Textbooks)

- Daniel Jurafsky & James H. Martin, An introduction to natural language processing, Pearson Prentice Hall, 2nd edition (May 26, 2008).

6c. Recommended Books

- V. Kumar and M. Hassan , Natural Language Processing for Arabic: Principles and Applications, 2019.

6d. Web Sites

- Course homepage is accessed from the FCI website: http://www.aun.edu.eg/Courses/

7. Facilities Required for Teaching and Learning

- A lecture hall equipped with projectors and computers.
- Labs equipped with computers and Internet facilities.
- A library.

Course Coordinator: Prof. Dr. Abdel-Rahman Hedar

Signature:

Date: 21/8/2023

Department Head: Prof. Dr. Khaled F. Hussain

Date: 21/8/2023

Course Matrix

Course Name | Arabic Language Processing **Course Code** CS702

Course Aims	Course Content	Teaching Weeks	ILOs				Teaching and Learning Methods							Assessment Tools	Criteria
			a's	b's	c's	d's	Lectures	Tutorial Exercises	Practical Exercises	Workshops	Projects	Case Study	Data Collections	Final Exam	
• The fundamental algorithms and mathematical models for natural language processing. • Provide	Regular Expressions, Finite State Automata, Context free grammars, Morphology and Phonology.	1-5	1-5	1-7	1-4	1-3	✓	✓						✓	
	Word prediction, Language modeling, Named entity recognition, and parts of speech.	6-10	1-5	1-7	1-5	1-4	✓	✓	✓			✓		✓	

foundational knowledge of Arabic linguistics, including its phonology, morphology, syntax, and semantics. • Address the challenges associated with the Arabic script, including handling diacritics and different orthographic forms.	Arabic language processing, Machine translation, Sentiment Analysis and Text Classification.	11-14	1-5	1-7	1-4, 6	1-4	✓	✓				✓		✓	

Course Coordinator	Prof. Dr. Abdel-Rahman Hedar	Department Head	Prof. Dr. Khaled F. Hussain
Signature		Signature	

Course Report

• Basic Information

- **Course Title:** Arabic Language Processing
- **Course Code:** CS702
- **Course hours per week:**

Lecture	Tutorial / Practical	Total
3	-	3

Names of lecturers contributing to the delivery of the course:

- **Course Coordinator:** Prof. Dr. Abdel-Rahman Hedar

• Statistical Information

No. of students attending the course: No. 3 % 100

No. of students completing the course: No. 3 % 100

Results:

Passed: No. 3 % 100 Failed: No. 0 % 0

Grading of successful students:

Excellent: No. 3 % 100 Very Good: No. 0 % 0

Good: No. 0 % - Pass: No. 0 % 0

- ## Professional Information

- ## Course Teaching

No	Topic taught	No. of hours		ILOs
		Lecture	Tut/Prac	
1	Regular Expressions, Finite State Automata, Context free grammars, Morphology and Phonology.	10	-	a1-a5, b1-b7, c1-c4, d1-d3
2	Word prediction, Language modeling, Named entity recognition, and parts of speech.	10	-	a1-a5, b1-b7, c1-c5, d1-d4
3	Arabic language processing, Machine translation, Sentiment Analysis and Text Classification.	8	-	a1-a5, b1-b7, c1-c4, c6, d1-d4

Topics taught as a percentage of the content specified:

> 90 % [ ] 70-90 % [✓] <70% [ ]

Reasons in detail for not teaching any topic:

If any topics were taught which are not specified, give reasons in detail:

No.	Topics	Reasons
	–	–

- ## Teaching and Learning Methods

Lectures:	✓
Practical training / Laboratory:	
Seminar / Workshop:	✓
Class activity:	✓
Case study:	
Assignments/Homework:	✓

If teaching and learning methods were used other than those specified, list and give reasons:

Method	Reasons

- ## Student Assessment

Assessment	Grade %
Final Exam	70%
Year Work	30%

Members of examination committee:

- Prof. Dr. Abdel-Rahman Hedar
- Prof. Dr. Khaled F. Hussain

Role of external evaluator:

- To verify that academic standards are appropriate for the award
- To verify that the assessment methods fairly assess the range of specified Intended Learning Outcomes
- To review and evaluate the course specifications and reports and provide a review report about them.

• Facilities and Teaching Materials

Totally adequate	✓
Adequate to some extent	
Inadequate	

List any inadequacies:

- No inadequacy.

• Administrative Constraints

List any difficulties encountered:

- No difficulty.

• Student Evaluation of the Course

No	Evaluation Items	Agree	Agree to some extent	Disagree
1	**Lecturer**	-	-	-
2	**Course**	-	-	-
3	**Facilities**	-	-	-
4	**Teaching Assistants**	-	-	-

Criticisms	Response of course team
-	-

• Comments from external evaluator(s)

Comments	Response of course team
-	-

• Course Enhancement

Progress on actions identified in the previous year's action plan:

Actions	Completion		Reasons for non-completion
	Yes	No	
Use a mix of lectures and interactive discussions to keep students engaged.	✓		

• Action plan for academic year 2022 – 2023

Actions Required	Completion Date	Person Responsible

Design assignments that require students to preprocess Arabic text, develop NLP models, and evaluate their performance.		
Provide access to Arabic corpora and datasets for hands-on practice.		

Course Coordinator: Prof. Dr. Abdel-Rahman Hedar

Signature:

Date: 21/8/2024

Selected Topics in Computer Science II

CS710

Course Specifications

Relevant program	Ph. D. in Computers and Information (Computer Science)
Department offers the program	Computer Science
Department offers the course	Computer Science
Academic year	1st Year
Date of specification approval	21/8/2023

A. Basic Information

1. **Course Title:** Selected Topics in Computer Science II
2. **Course Code:** CS710
3. **Course hours per week:**

Lecture	Tutorial / Practical	Total
3	–	3

B. Professional Information

1. Overall aims of the course

Upon completing this course the student will have learned, through appropriate classroom and laboratory experiences, the following.

- Provide students with an overview of the latest research areas in computer science.
- Teach students about the methodologies and techniques used in contemporary research.

2. Intended Learning Outcomes (ILOs) of the course

a. Knowledge and Understanding

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

a1. Theories, fundamentals, and current state-of-the-art in Computer Science domain and their related domains.
a2. Scientific research fundamentals, methodologies, ethics, and its various tools.
a3. Related knowledge of professional practice effect on the environment and methods to develop and preserve it.
a4. Visualizing data input and control of computer systems.

b. Intellectual Skills

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

b1. Analyze and evaluate the information in the domain of Computer Science and take references and induce from them.
b2. Solve specialized problems based on the available inputs.
b3. Talk and discuss based on proofs and evidences.
b4. Recognize the need for, and show an ability for, dealing with constantly changing technology and continuing professional development.
b5. Generate and apply innovative solutions to solve problems based on reasoned rationale.

c. Professional and Practical Skills

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

c1. Master basic and modern professional skills in Computer Science.
c2. Use technological tools to serve the professional practice.
c3. Analyze and apply techniques and algorithms for recognizing and interpreting human interfacing with computers.
c4. Propose and design possible alternative directions for further work.
c5. Analyze, evaluate and synthesize research and apply theoretical ideas to practical settings.

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. Use different recourses to obtain information and knowledge.
d4. Effectively make ideas, designs and solutions in a logical framework in a variety of forms with proper language structure and mechanics, and to produce appropriate written documentation.

3. Contents

No	Topic taught	No. of hours		ILOs
		Lecture	Tut/Prac	
1	Hierarchical Temporal Memory (HTM) Whitepaper and Encoding Data for HTM Systems	18	–	a1-a4, b1-b5, c1-c5, d1-d4
2	Going Beyond the Point Neuron: Active Dendrites and Sparse Representations for Continual Learning	6	–	a1-a4, b1-b3, c1-c3, d1-d4
3	Locations in the Neocortex: A Theory of Sensorimotor Object Recognition Using Cortical Grid Cells	6	–	a1-a4, b1-b5, c1-c5, d1-d4
4	A Framework for Intelligence and Cortical Function Based on Grid Cells in the Neocortex	6	–	a1-a4, b1-b3, c1-c3, d1-d4
5	A Thousand Brains: Toward Biologically Constrained AI	6	–	a1-a4, b1-b3, c1-c3, d1-d4

4. Teaching and Learning Methods

4a. Lectures

4b. Tutorial Exercises

4c. Workshops

4d. Projects

5. Student Assessment

5a. Tools

Final Exam	To measure knowledge, understanding, intellectual professional and general skills.
Projects	To measure professional and general skills.

5b. Time Schedule

Assessment	Week No
Final Exam	15

5c. Grading System

Assessment	**Grade %**
Final Exam	70%
Year Work	30%

5d. Formative Assessment

Regular quizzes distributed along the whole semester.

6. List of References

6a. Course Notes

- Short course notes available at the course homepage.

6b. Required Books (Textbooks)

- Hawkins, Jeff., A thousand brains: A new theory of intelligence, Basic Books, 2021.

6c. Recommended Books

- Hawkins, Jeff. and Blakeslee, Sandra, On Intelligence: How a New Understanding of the Brain Will Lead to the Creation of Truly Intelligent Machines, Times Books, 2007

6d. Web Sites

- Course homepage is accessed from the FCI website: http://www.aun.edu.eg/Courses/

7. Facilities Required for Teaching and Learning

- A lecture hall equipped with projectors and computers.
- Labs equipped with computers and Internet facilities.
- A library.

Course Coordinator: Prof. Dr. Khaled F. Hussain

Signature:

Date: 19/8/2023

Department Head: Prof. Dr. Khaled F. Hussain

Signature:

Date: 19/8/2023

Course Matrix

Course Name | Selected Topics in Computer Science II **Course Code** CS710

Course Aims	Course Content	Teaching Weeks	ILOs				Teaching and Learning Methods							Assessment Tools	Criteria
			a's	b's	c's	d's	Lectures	Tutorial Exercises	Practical Exercises	Workshops	Projects	Case Study	Data Collections	Final Exam	
• Provide students with an overview of the latest research areas in computer science. • Teach students about the methodologies and techniques used in contemporary research.	Hierarchical Temporal Memory (HTM) Whitepaper and Encoding Data for HTM Systems	1-6	**1-4**	**1-5**	**1-5**	**1-4**	✓	✓						✓	
	Going Beyond the Point Neuron: Active Dendrites and Sparse Representations for Continual Learning	7-8	**1-4**	**1-3**	**1-3**	**1-4**	✓	✓						✓	
	Locations in the Neocortex: A Theory of Sensorimotor Object Recognition Using Cortical Grid Cells	9-10	**1-4**	**1-5**	**1-5**	**1-4**	✓	✓						✓	
	A Framework for Intelligence and Cortical Function Based on Grid Cells in the Neocortex	11-12	**1-4**	**1-3**	**1-3**	**1-4**	✓	✓						✓	
	A Thousand Brains: Toward Biologically Constrained AI	13-14	**1-4**	**1-3**	**1-3**	**1-4**	✓	✓						✓	

Course Coordinator | Prof. Dr. Khaled F. Hussain Department Head | Prof. Dr. Khaled F. Hussain

Signature

Signature

Course Report

Basic Information

- **Course Title:** Selected Topics in Computer Science II
- **Course Code:** CS710
- **Course hours per week:**

Lecture	Tutorial / Practical	Total
3	-	3

Names of lecturers contributing to the delivery of the course:

- **Course Coordinator:** Prof. Dr. Khaled F. Hussain

Statistical Information

No. of students attending the course: No. 3 % 100

No. of students completing the course: No. 3 % 100

Results:

Passed: No. 3 % 100 Failed: No. 0 % 0

Grading of successful students:

Excellent: No. 3 % 100 Very Good: No. 0 % 0

Good: No. 0 % 0 Pass: No. 0 % 0

- ## Professional Information

- ### Course Teaching

No	Topic taught	No. of hours		ILOs
		Lecture	Tut/Prac	
1	Hierarchical Temporal Memory (HTM) Whitepaper and Encoding Data for HTM Systems	18	-	a1-a4, b1-b5, c1-c5, d1-d4
2	Going Beyond the Point Neuron: Active Dendrites and Sparse Representations for Continual Learning	6	-	a1-a4, b1-b3, c1-c3, d1-d4
3	Locations in the Neocortex: A Theory of Sensorimotor Object Recognition Using Cortical Grid Cells	6	-	a1-a4, b1-b5, c1-c5, d1-d4
4	A Framework for Intelligence and Cortical Function Based on Grid Cells in the Neocortex	6	-	a1-a4, b1-b3, c1-c3, d1-d4
5	A Thousand Brains: Toward Biologically Constrained AI	6	-	a1-a4, b1-b3, c1-c3, d1-d4

Topics taught as a percentage of the content specified:

> 90 % [ ] 70-90 % [✓] <70% [ ]

Reasons in detail for not teaching any topic:

If any topics were taught which are not specified, give reasons in detail:

No.	Topics	Reasons
	–	–

- ### Teaching and Learning Methods

Lectures:	✓
Practical training / Laboratory:	
Seminar / Workshop:	✓
Class activity:	✓
Case study:	
Assignments/Homework:	✓

If teaching and learning methods were used other than those specified, list and give reasons:

Method	Reasons

- ### Student Assessment

Assessment	Grade %
Final Exam	70%
Year Work	30%

Members of examination committee:

- Prof. Dr. Khaled F. Hussain
- Prof. Dr. Abdel-Rahman Hedar

Role of external evaluator:

- To verify that academic standards are appropriate for the award
- To verify that the assessment methods fairly assess the range of specified Intended Learning Outcomes
- To review and evaluate the course specifications and reports and provide a review report about them.

• Facilities and Teaching Materials

Totally adequate	✓
Adequate to some extent	
Inadequate	

List any inadequacies:

- No inadequacy.

• Administrative Constraints

List any difficulties encountered:

- No difficulty.

• Student Evaluation of the Course

No	Evaluation Items	Agree	Agree to some extent	Disagree
1	**Lecturer**	-	-	-
2	**Course**	-	-	-
3	**Facilities**	-	-	-
4	**Teaching Assistants**	-	-	-

Criticisms	Response of course team
-	-

• Comments from external evaluator(s)

Comments	Response of course team
-	-

• Course Enhancement

Progress on actions identified in the previous year's action plan:

Actions	Completion		Reasons for non-completion
	Yes	No	
No Action	-	-	-

- **Action plan for academic year 2024 – 2025**

Actions Required	Completion Date	Person Responsible

Course Coordinator: Prof. Dr. Khaled F. Hussain

Signature:

Date: 21/8/2024

Seminar Specifications and Report

Seminar Specifications

Relevant program	Ph.D. in Computers and Information (Computer Science)
Department offers the program	Computer Science
Department offers the course	Computer Science
Academic year	2nd Year
Date of specification approval	21/8/2023

A. Basic Information

1. **Title:** Seminar

B. Professional Information

1. Overall aims of the thesis

Upon completing this thesis, the student will have learned, through appropriate discussion and laboratory experiences, the following.

- Provide students with exposure to the latest research developments and emerging trends in computer science.
- Develop students' abilities to critically analyze and evaluate research papers and technical presentations.
- Enhance students' skills in conducting research, including literature review, problem formulation, and presentation of findings.
- Improve students' ability to effectively communicate complex technical ideas, both orally and in writing.

2. Intended Learning Outcomes (ILOs) of the course

a. Knowledge and Understanding

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

a1. Effective exchange between professional practices and their reflection on the environment.
a2. Scientific development in computer science.
a3. Ethical and legal principles for professional practice in computer science.
a4. Quality principles of professional practice in computer science.

a5. The fundamentals of scientific research and its ethics.

b. Intellectual Skills

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

b1. Analyze and evaluate the information in the domain of computer science and take references from them for problem solving.
b2. Solve specialized problems without enough inputs.
b3. Link different knowledge to solve professional problems.
b4. Carry out a research study and write a thesis around a research problem in computer science.
b5. Assess risks in professional practice of computer science.
b6. Plan to develop the performance in computer science.
b7. Take professional decisions in different scenarios.
b8. Recognize the need for, and show ability for, dealing with constantly changing technology and continuing professional development.
b9. Generate and apply innovative solutions to solve problems based on reasoned rationale.
b10. Write scientific papers in computer science.
b11. Talk and discuss based on proofs and evidences.
b12. Create and innovate.

c. Professional and Practical Skills

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

c1. Master basic and modern professional skills in computer science.
c2. Write and evaluate professional reports.
c3. Evaluate current methods and tools in computer science.
c4. Propose and design possible alternative directions for further work.
c5. Analyze, evaluate and synthesize research and apply theoretical ideas to practical settings.
c6. Use technological tools to serve the professional computer science practice.
c7. Plan to develop the professional computer science practice and the performance of the others.

d. General and Transferable Skills

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

d1. Use the information technology to serve the professional practice.
d2. Communicate efficiently by different means.
d3. Have self-assessment and identification of personal learning needs.
d4. Use different recourses to obtain information and knowledge.
d5. Propose roles and indicators to evaluate the performance of the others.
d6. Work in a team and lead teams in different professional tracks.
d7. Manage time efficiently.
d8. Long-life self-learning.
d9. Participate within the professional, legal and ethical framework within which they would be expected to operate as professionals within the IT industry.
d10. Effectively present ideas, designs and solutions in a logical framework in a variety of forms with proper language structure and mechanics, and to produce appropriate written documentation.
d11. Make use of the qualities and transferable skills necessary for employment requiring concerning the exercise of initiative and personal responsibility, and decision making in complex and unpredictable situations.

3. Teaching and Learning Methods

4a. Discussion
4b. Workshops
4c. Projects
4d. Case Study
4e. Data Collections

4. Student Assessment

5a. Tools

Oral examination	Knowledge and Understanding - Intellectual Skills - General Skills

5. Facilities Required for Teaching and Learning

- Labs equipped with computers and Internet facilities.
- Advanced research labs.
- Discussion rooms.
- Digital library contains links to international journals.
- A library.

Department Head: Prof. Dr. Khaled F. Hussain

Signature:

Date: 21/8/2023

Course Report

Basic Information

- **Course Title:** Seminar
  - **Course hours per week:**

Lecture	Tutorial / Practical	Total
2	-	2

  - **Names of lecturers contributing to the delivery of the course:**
    - **Course Coordinator:** Prof. Dr. Khaled F. Hussain

Statistical Information

No. of students attending the course: No. 3 % 100

No. of students completing the course: No. 3 % 100

Results:

Passed: No. 3 % 100 Failed: No. 0 % 0

Grading of successful students:

Excellent: No. 3 % 100 Very Good: No. 0 % 0

Good: No. 0 % 0 Pass: No. 0 % 0

Professional Information

Teaching and Learning Methods

Lectures:	✓
Practical training / Laboratory:	
Seminar / Workshop:	✓
Class activity:	✓
Case study:	
Assignments/Homework:	✓

If teaching and learning methods were used other than those specified, list and give reasons:

Method	Reasons

- ## Student Assessment

Assessment	Grade %
Final Exam	70%
Year Work	30%

Members of examination committee:

- Prof. Dr. Khaled F. Hussain

- ## Facilities and Teaching Materials

Totally adequate	✓
Adequate to some extent	
Inadequate	

List any inadequacies:

- No inadequacy.

- ## Administrative Constraints

List any difficulties encountered:

- No difficulty.

- ## Student Evaluation of the Course

No	Evaluation Items	Agree	Agree to some extent	Disagree
1	**Lecturer**	-	-	-
2	**Course**	-	-	-
3	**Facilities**	-	-	-
4	**Teaching Assistants**	-	-	-

Criticisms	Response of course team
-	-

- ## Comments from external evaluator(s)

Comments	Response of course team
-	-

- ## Course Enhancement

Progress on actions identified in the previous year's action plan:

Actions	Completion		Reasons for non-completion
	Yes	No	
Require students to critically review papers or presentations, providing constructive feedback.	✓		

- ## Action plan for academic year 2024 – 2025

Actions Required	Completion Date	Person Responsible

Facilitate peer presentations and discussions to encourage active learning and engagement.		
Have students undertake individual or group research projects related to seminar topics.		

Course Coordinator: Prof. Dr. Khaled F. Hussain

Signature:

Date: 21/8/2024

Research papers
Specification and Report

Research papers Specifications

Relevant program	Ph.D. in Computers and Information (Computer Science)
Department offers the program	Computer Science
Department offers the course	Computer Science
Academic year	2nd Year
Date of specification approval	21/8/2023

C. Basic Information

2. **Title:** Research papers

D. Professional Information

6. Overall aims of the thesis

Upon completing this thesis, the student will have learned, through appropriate discussion and laboratory experiences, the following.

- Mastering the research activities.
- Developing the science that would maximize the returns.
- Contributing something original to the field.
- Ethical issues for the research by the University Ethics Committee.
- The topic matches the student' interests and capabilities.

7. Intended Learning Outcomes (ILOs) of the course

e. Knowledge and Understanding

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

a6. Effective exchange between professional practices and their reflection on the environment.
a7. Scientific development in computer science.
a8. Ethical and legal principles for professional practice in computer science.
a9. Quality principles of professional practice in computer science.

a10. The fundamentals of scientific research and its ethics.

f. Intellectual Skills

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

b1. Analyze and evaluate the information in the domain of computer science and take references from them for problem solving.
b2. Solve specialized problems without enough inputs.
b3. Link different knowledge to solve professional problems.
b4. Carry out a research study and write a thesis around a research problem in computer science.
b5. Assess risks in professional practice of computer science.
b6. Plan to develop the performance in computer science.
b7. Take professional decisions in different scenarios.
b8. Recognize the need for, and show ability for, dealing with constantly changing technology and continuing professional development.
b9. Generate and apply innovative solutions to solve problems based on reasoned rationale.
b10. Write scientific papers in computer science.
b11. Talk and discuss based on proofs and evidences.
b12. Create and innovate.

g. Professional and Practical Skills

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

c8. Master basic and modern professional skills in computer science.
c9. Write and evaluate professional reports.
c10. Evaluate current methods and tools in computer science.
c11. Propose and design possible alternative directions for further work.
c12. Analyze, evaluate and synthesize research and apply theoretical ideas to practical settings.
c13. Use technological tools to serve the professional computer science practice.
c14. Plan to develop the professional computer science practice and the performance of the others.

h. General and Transferable Skills

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

d1. Use the information technology to serve the professional practice.
d2. Communicate efficiently by different means.
d3. Have self-assessment and identification of personal learning needs.
d4. Use different recourses to obtain information and knowledge.
d5. Propose roles and indicators to evaluate the performance of the others.
d6. Work in a team and lead teams in different professional tracks.
d7. Manage time efficiently.
d8. Long-life self-learning.
d9. Participate within the professional, legal and ethical framework within which they would be expected to operate as professionals within the IT industry.
d10. Effectively present ideas, designs and solutions in a logical framework in a variety of forms with proper language structure and mechanics, and to produce appropriate written documentation.
d11. Make use of the qualities and transferable skills necessary for employment requiring concerning the exercise of initiative and personal responsibility, and decision making in complex and unpredictable situations.

8. Teaching and Learning Methods

4f. Discussion
4g. Workshops
4h. Projects
4i. Case Study
4j. Data Collections

9. Student Assessment

5b. Tools

Oral examination	Knowledge and Understanding - Intellectual Skills - General Skills
Thesis	Knowledge and Understanding - Intellectual Skills - Professional Skills - General Skills

10. Facilities Required for Teaching and Learning

- Labs equipped with computers and Internet facilities.
- Advanced research labs.
- Discussion rooms.
- Digital library contains links to international journals.
- A library.

Department Head: Prof. Dr. Khaled F. Hussain

Signature:

Date: 21/8/2023

Course Report

Basic Information

- **Course Title:** Research papers
- **Course hours per week:**

Lecture	Tutorial / Practical	Total
4	-	4

- **Names of lecturers contributing to the delivery of the course:**
  - **Course Coordinator:** Prof. Dr. Khaled F. Hussain

Statistical Information

No. of students attending the course: No. 2 % 100

No. of students completing the course: No. 2 % 100

Results:

Passed: No. 2 % 100 Failed: No. 0 % 0

Grading of successful students:

Excellent: No. 2 % 100 Very Good: No. 0 % 0

Good: No. 0 % 0 Pass: No. 0 % 0

Professional Information

Teaching and Learning Methods

Lectures:	✓
Practical training / Laboratory:	
Seminar / Workshop:	✓
Class activity:	✓
Case study:	
Assignments/Homework:	✓

If teaching and learning methods were used other than those specified, list and give reasons:

Method	Reasons

- ## Student Assessment

Assessment	Grade %
Final Exam	70%
Year Work	30%

Members of examination committee:

- Prof. Dr. Khaled F. Hussain

- ## Facilities and Teaching Materials

Totally adequate	✓
Adequate to some extent	
Inadequate	

List any inadequacies:

- No inadequacy.

- ## Administrative Constraints

List any difficulties encountered:

- No difficulty.

- ## Student Evaluation of the Course

No	Evaluation Items	Agree	Agree to some extent	Disagree
1	**Lecturer**	-	-	-
2	**Course**	-	-	-
3	**Facilities**	-	-	-
4	**Teaching Assistants**	-	-	-

Criticisms	Response of course team
-	-

- ## Comments from external evaluator(s)

Comments	Response of course team
-	-

- ## Course Enhancement

Progress on actions identified in the previous year's action plan:

Actions	Completion		Reasons for non-completion
	Yes	No	
Assign tasks where students write reviews of research papers, providing constructive criticism and feedback.	✓		

- **Action plan for academic year 2024 – 2025**

Actions Required	Completion Date	Person Responsible
Implement a peer review process where students review and provide feedback on each other's papers.		

Course Coordinator: Prof. Dr. Khaled F. Hussain

Signature:

Date: 21/8/2024

Ph.D. Thesis Specifications

Thesis Specifications

Relevant program	Ph.D. in Computers and Information (Computer Science)
Department offers the program	Computer Science
Department offers the course	Computer Science
Academic year	2nd Year
Date of specification approval	21/8/2023

E. Basic Information

3. **Title:** Ph.D. Thesis

F. Professional Information

11. Overall aims of the thesis

Upon completing this thesis, the student will have learned, through appropriate discussion and laboratory experiences, the following.

- Mastering the research activities.
- Developing the science that would maximize the returns.
- Contributing something original to the field.
- Ethical issues for the research by the University Ethics Committee.
- The topic matches the student' interests and capabilities.

12. Intended Learning Outcomes (ILOs) of the course

i. Knowledge and Understanding

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

a11. Effective exchange between professional practices and their reflection on the environment.
a12. Scientific development in computer science.
a13. Ethical and legal principles for professional practice in computer science.
a14. Quality principles of professional practice in computer science.
a15. The fundamentals of scientific research and its ethics.

j. Intellectual Skills

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

b13. Analyze and evaluate the information in the domain of computer science and take references from them for problem solving.
b14. Solve specialized problems without enough inputs.
b15. Link different knowledge to solve professional problems.
b16. Carry out a research study and write a thesis around a research problem in computer science.
b17. Assess risks in professional practice of computer science.
b18. Plan to develop the performance in computer science.
b19. Take professional decisions in different scenarios.
b20. Recognize the need for, and show ability for, dealing with constantly changing technology and continuing professional development.
b21. Generate and apply innovative solutions to solve problems based on reasoned rationale.
b22. Write scientific papers in computer science.
b23. Talk and discuss based on proofs and evidences.
b24. Create and innovate.

k. Professional and Practical Skills

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

c15. Master basic and modern professional skills in computer science.
c16. Write and evaluate professional reports.
c17. Evaluate current methods and tools in computer science.
c18. Propose and design possible alternative directions for further work.
c19. Analyze, evaluate and synthesize research and apply theoretical ideas to practical settings.
c20. Use technological tools to serve the professional computer science practice.
c21. Plan to develop the professional computer science practice and the performance of the others.

l. General and Transferable Skills

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

d12. Use the information technology to serve the professional practice.
d13. Communicate efficiently by different means.
d14. Have self-assessment and identification of personal learning needs.
d15. Use different recourses to obtain information and knowledge.
d16. Propose roles and indicators to evaluate the performance of the others.
d17. Work in a team and lead teams in different professional tracks.
d18. Manage time efficiently.
d19. Long-life self-learning.
d20. Participate within the professional, legal and ethical framework within which they would be expected to operate as professionals within the IT industry.
d21. Effectively present ideas, designs and solutions in a logical framework in a variety of forms with proper language structure and mechanics, and to produce appropriate written documentation.
d22. Make use of the qualities and transferable skills necessary for employment requiring concerning the exercise of initiative and personal responsibility, and decision making in complex and unpredictable situations.

13. Teaching and Learning Methods

4k. Discussion
4l. Workshops
4m. Projects
4n. Case Study
4o. Data Collections

14. Student Assessment

5c. Tools

Oral examination	Knowledge and Understanding - Intellectual Skills - General Skills
Thesis	Knowledge and Understanding - Intellectual Skills - Professional Skills - General Skills

15. Facilities Required for Teaching and Learning

- Labs equipped with computers and Internet facilities.
- Advanced research labs.
- Discussion rooms.
- Digital library contains links to international journals.
- A library.

Department Head: Prof. Dr. Khaled F. Hussain

Signature:

Date: 21/8/2023