Academic Reference Standards (ARS)

for

<u>Artificial Intelligence Program</u>

BSc Program

Faculty of Computer and Information Sciences,

Ain Shams University

Contents

Introduction

We developed our own Academic Reference Standards (ARS) for Artificial Intelligence specialization, which is based on the National Academic References Standards (NARS) for Computing Academic Programs, developed by Computing and Engineering Sector in the Supreme Council of Universities.

National Academic reference Standards (NARS) for Computing and Information

1-Attributes of the Graduates
The graduates of the computing and Information programs should be able to:

1.1 Apply the fundamental theories and principles of computing and information applications.

1.2. Integrate and evaluate the computing tools and facilities.

1.3. Apply knowledge of mathematics and science.

1.4. Design a computing system, component and process to meet the required needs within realistic constraints

1.5. Exploit the techniques, skills and up-to-date computing tools, necessary for computing and information practice.

1.6. Display professional responsibilities and ethical, societal and cultural concerns

1.7. Use, compare and evaluate a range of formal and informal techniques, theories and methods to develop computing and information applications.

1.8. Consider and deal with the individual, social, environmental, organizational and economic implications of the application of computing and information.

1.9. Carry out a work plan with minimal supervision.

1.10. Communicate effectively.

1.11. Hold knowledge and skills required by the computing and information industry.

1.12. Engage in self and life-long learning and research in computing and information.

1.13. Fulfill requirements of potential employers.

2- Intended Learning Outcomes (ILOs)

2.1- Knowledge and Understanding

The graduates of the computing and information programs should acquire the knowledge and understanding of:

2.1.1. Essential facts, concepts, principles and theories relating to computing and information and computer applications as appropriate to the program of study.

2.1.2. Modeling and design of computer-based systems bearing in mind the trade-offs.

2.1.3. Tools, practices and methodologies used in the specification, design, implementation and evaluation of computer software systems.

2.1.4. Criteria and specifications appropriate to specific problems, and plan strategies for their solution.

2.1.5. The extent to which a computer-based system meets the criteria defined for its current use and future development.

2.1.6. The current and underlying technologies that support computer processing and inter-computer communication.

2.1.7. Principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results.

2.1.8. Management and economics principles relevant to computing and information disciplines.

2.1.9. Professional, moral and ethical issues involved in the exploitation of computer technology and be guided by the appropriate professional, ethical and legal practices relevant to the computing and information industry.

2.1.10. Current developments in computing and information research.

2.1.11. Requirements, practical constraints and computer-based systems

2.2. Intellectual Skills

The graduates of the computing and Information programs should be able to:

2.2.1 Analyze computing problems and provide solutions related to the design and construction of computing systems.

2.2.2. Realize the concepts, principles, theories and practices behind computing and information as an academic discipline.

2.2.3. Identify criteria to measure and interpret the appropriateness of a computer system for its current deployment and future evolution.

2.2.4. Analyze, propose and evaluate alternative computer systems and processes taking into account limitations, and quality constraints.

2.2.5. Make ideas, proposals and designs using rational and reasoned arguments for presentation of computing systems.

2.2.6. Evaluate the results of tests to investigate the functionality of computer systems.

2.2.7. Achieve judgments considering balanced costs, benefits, safety, quality, reliability, and environmental impact

2.2.8. Familiar with the professional, legal, moral and ethical issues relevant to the computing industry.

2.2.9. Evaluate research papers in a range of knowledge areas

 ## 2.3. Professional / Practical

 The graduates of the computing and information programs should be able to:

 2.3.1. Operate computing equipment, recognizing its logical and physical properties, capabilities and limitations.

2.3.2. Implement comprehensive computing knowledge and skills in projects and in deployment of computers to solve position practical problems.

2.3.3. Deploy the equipment and tools used for the construction, maintenance and documentation of computer applications.

2.3.4. Apply computing information retrieval skills in computing community environment and industry.

2.3.5. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material

2.3.6. Design, implement, maintain, and manage software systems.

2.3.7. Assess the implications, risks or safety aspects involved in the operation of computing equipment within a specific context.

2.3.8. Handle a mass of diverse data, assess risk and draw conclusions.

2.4. Transferable skills

Graduates of the computing and information programs should be able:

2.4.1. Demonstrate the ability to make use of a range of learning resources and to manage one's own learning.

2.4.2. Demonstrate skills in group working, team management, time management and organizational skills.

2.4.3. Show the use of information-retrieval.

2.4.4 Use an appropriate mix of tools and aids in preparing and presenting reports for a range of audiences, including management, technical, users, industry or the academic community.

2.4.5. Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension.

2.4.6. Reveal communication skills, public speaking and presentation skills, and delegation, writing skills, oral delivery, and effectively using various media for a variety of audiences.

2.4.7. Show the use of general computing facilities.

2.4.8. Demonstrate an appreciation of the need to continue professional development in recognition of the requirement for life-long learning.

Academic Reference Standards (ARS)
for Artificial Intelligence Program

1-Attributes of the Graduates

In addition to the attributes of the undergraduate degree, the Artificial Intelligence Program graduates should be able to:

1.1. Prepare students for careers in advanced research and/or development in Artificial Intelligence by equipping them with relevant and up-to-date knowledge and skills

1.2. Develop the students' ability to make a critical evaluation of the theories, techniques, tools and systems used in this field and associated areas of Artificial Intelligence

1.3. Enable students to contribute to future developments in the field by providing them with an understanding of recent advances and current research activity

1.4. Enable students to develop particular expertise in a chosen area of Artificial Intelligence

1.5. Develop the students' ability to make an effective contribution to team-based activity

1.6. Identify constraints, uncertainties and risk of the system

1.7. Perform independent and efficient time management

2- Intended Learning Outcomes (ILOs)

2.1. Knowledge and understanding

In addition to the Knowledge and understanding, the Artificial Intelligence Program graduates should be able to:

2.1.1 Identify concepts and theories of mathematics and science related to the field of Artificial Intelligence

2.1.2 Understand basics of computer networking and programming language

2.1.3 Understand principles of artificial intelligence, genetic algorithm, intelligent autonomous robotics, computer vision and game theory

2.1.4 Recognize methodologies for solving problems especially problems related to artificial intelligence

2.1.5 Explain the professional ethics and human rights of software production and engineering

2.1.6 Compare current technologies and tools used for software production, development and engineering

2.1.7 Clarify software security, safety and environmental issues

2.1.8 Understand the tools, practices and methodologies used in the specification, design, implementation and critical evaluation of artificial intelligence.

2.2. Intellectual Skills

In addition to the Intellectual Skills, the Artificial Intelligence Program graduates should be able to:

2.2.1 Model problems using mathematical models, programming methods and artificial intelligence techniques.

2.2.2 Analyze the extent to which a computer-based system or intelligent machine meets the criteria defined for its current use and future development.

2.2.3 Have analytical thinking that enables him/her to select appropriate solutions for software design and developing problems based on cost, benefit and quality

2.2.4 Take into consideration the adoption, economical and risks aspects involved in the process of artificial intelligence.

2.2.5 Assess current research work and undertake independent research.

2.2.6 Solve the problems encountered in the process of software design and production taking into consideration the limitations and the practical criteria and constraints of the computation capabilities

2.2.7 Analyze the results of computational models besides the limitations of the computing capabilities.

2.2.8 Evaluate research papers to realize the research problems and practices behind computing and artificial intelligence

2.2.9 Select appropriate tools and technologies to varieties of artificial intelligence problems

2.2.10 Familiar with the professional, legal, moral and ethical issues relevant to the software engineering.

2.3. Practical and Professional Skills

In addition to Practical and Professional Skills, the Artificial Intelligence Program graduates should be able to:

2.3.1 Integrate knowledge of mathematics, science, IT, and business context in order to solve problems in the area of software production and adoption.

2.3.2 Collect, analyze and interpret data using software and hardware tools.

2.3.3   Develop and improve software design, products and service.

2.3.4 Solve software problems using numerical modeling, programming techniques and information retrieval skills

2.3.5 Implement comprehensive computing knowledge and intellectual skills in projects

2.3.6 Use many computing tools and techniques, such as database, web-based and graphic tools and genetic algorithms, intelligent robotics and pattern recognition.

2.3.7 Prepare and present technical materials

2.3.8 Assess the implications, risks or safety aspects involved in the operation of computing equipment within a specific context.

2.4. General and Transferable Skills

In addition to General and Transferable Skills, the Artificial Intelligence Program graduates should be able to:

2.4.1 Work efficiently in a team

2.4.2 Work in stressful environment and within constraints

2.4.3 Communicate effectively

2.4.4 Demonstrate efficient IT capabilities

2.4.5 Lead and motivate individuals

2.4.6 Manage tasks and resources

2.4.7 self-learning and information gathering

2.4.8 Acquire entrepreneurial skills

2.4.9 Demonstrate critical thinking and problem-solving skills

Curriculum Structure

	Subject Area	Number of Credit Hours	Number of Courses	Percentage of Credit Hours	Tolerance % in NARS
A	University Requirements (Humanities, ethical and Social Sciences)	16	8	11.3	8-10%
B	Mathematics and Basic Sciences	25	7	17.7	16-18%
C	Faculty Requirements (Basic Computing Sciences)	43	13	30	26-28%
D G	Program Requirements (specialization) + Optional (Institution character-identifying subjects)	51	17	36	28-30% + 16-4%
E	Training	-	-	-	3-5%
F	Projects	6		4.2	3-5%
	Total	141	45	100%	

Glossary

1. **Institution**

   A University, Faculty or higher institute providing education programs leading to a first university degree or a higher degree (Master's or Doctorate)..

2. **Attributes of the Graduates**

   Competencies expected from the graduates based on the acquired knowledge and skills gained upon completion of a particular program..

3. **National Academic Reference Standards (NARS)**

   Reference points designed by NAQAAE to outline/describe the expected minimum knowledge and skills necessary to fulfill the requirements of a program of study..

4. **Academic Standards**

   Reference points defined by an institution comprising the collective knowledge and skills to be gained by the graduates of a particular program.. The academic standards should surpass the NARS, and be approved by NAQAAE..

5. **Subject Benchmark Statements**

   Guideline statements that detail what can be expected of a graduates in terms of the learning outcomes to satisfy the standards set for the program.. They enable the outcomes to be compared, reviewed and evaluated against agreed upon standards..

6. The Program

A set of educational courses and activities designed by the institution to determine the systematic learning progress.. The program also imparts the intended competencies required for the award of an academic degree..

7. Intended Learning Outcomes (ILOs)

Subject-specific knowledge, understanding and skills intended by the institution to be gained by the learners completing a particular educational activity.. The ILOs emphasize what is expected that learners will be able to do as a result of a learning activity..

8. Knowledge and Understanding

Knowledge is the intended information to be gained from an educational activity including facts, terms, theories and basic concepts.. Understanding involves comprehending and grasping the meaning or the underlying explanation of scientific objects..

9. Intellectual Skills

Learning and cognitive capabilities that involve critical thinking and creativity.. These include application, analysis, synthesis and evaluation of information..

10. Professional and Practical Skills

Application of specialized knowledge, training and proficiency in a subject or field to attain successful career development and personal advancement..

11. General and Transferable Skills

Skills that are not subject-specific and commonly needed in education, employment, life-long learning and self development.. These skills include communication, team work, numeracy, independent learning, interpersonal relationship, and problem solving...... etc..