



Faculty of Computer & Information Sciences
AIN SHAMS UNIVERSITY
Performance Evaluation and Quality Assurance Unit

Academic Reference Standards (ARS)
for
Cyber Security Program
BSc Program
Faculty of Computer and Information Sciences,
Ain Shams University

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Introduction

We developed our own Academic Reference Standards (ARS) for Cyber Security 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 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 evaluate 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, using 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 Cyber Security Program

1-Attributes of the Graduates

In addition to the attributes of the undergraduate degree, the Cyber Security Program graduates should be able to:

- 1.1. Have the versatility and personal qualities to manage, implement and assess the security of business activities in a global context.
- 1.2. Understand the working of socio-technical systems in order to adequately prevent or respond to cyber security incidents.
- 1.3. Be aware of the wider impact of cyber security decisions on organizations (businesses, organizations) and society.
- 1.4. Have highly developed interpersonal skills.
- 1.5. Manage their own personal development and lifelong learning.
- 1.6. Understand fundamentals of Information Security Risk Assessments, Biometrics Intrusion detection and Prevention, Number Theory and Cryptography and network security.
- 1.7. Communicate effectively by oral, written, and visual means.
- 1.8. Work effectively as an individual and as a member of a team.
- 1.9. Perform independent and efficient time management.
- 1.10. Aware of key ethical issues affecting cyber security systems and their responsibilities as cyber security professionals.
- 1.11. Identify constraints, uncertainties and risk of the system.

2- Intended Learning Outcomes (ILOs)

2.1. Knowledge and understanding

In addition to the Knowledge and understanding, the Cyber Security Program graduates should be able to:

- 2.1.1 Identify concepts and theories of mathematics and science related to the field of cyber security.

- 2.1.2 Understand the fundamentals of computing concepts, including computer hardware, computer architecture, operating systems, and programming.
- 2.1.3 Recognize methodologies for solving problems, especially problems related to security.
- 2.1.4 Explain the professional ethics and human rights of software production and engineering.
- 2.1.5 Compare current technologies and tools used for software production, development, and engineering.
- 2.1.6 Recognize Tools, practices and methodologies used in the specification, design, implementation, and evaluation of computer software systems.
- 2.1.7 Clarify software security, safety, and environmental issues.
- 2.1.8 Identify Current developments in computing and information research.

2.2. Intellectual Skills

In addition to the Intellectual Skills, the Cyber Security Program graduates should be able to:

- 2.2.1 Model problems using mathematical models, programming methods and security techniques.
- 2.2.2 Create pieces of software based on the principles of software design and engineering.
- 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 risky aspects involved in the process of cyber security.
- 2.2.5 Assess and evaluate the performance of software security systems.
- 2.2.6 Analyze computing system design problems of varying types and specify those problems, and proposed solutions, in a suitable formalism.

- 2.2.7 Judge costs, benefits, quality, reliability and environmental impact of software systems production and adoption.
- 2.2.8 Evaluate research papers to realize the research problems and practices behind computing.
- 2.2.9 Analyze systems, processes, and components critically.
- 2.2.10 Select appropriate tools and technologies to varieties of cyber security problems.
- 2.2.11 Familiar with the professional, legal, moral, and ethical issues relevant to software engineering and cyber security.

2.3. Practical and Professional Skills

In addition to Practical and Professional Skills, the Cyber Security 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 Security 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 Apply principles of safety and reliability in developing software.
- 2.3.7 Prepare and present technical materials.
- 2.3.8 Use many computing tools and techniques, such as database, web-based, Cryptography, intelligent robotics and network security techniques.

2.4. General and Transferable Skills

In addition to General and Transferable Skills, the Cyber Security 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 to prepare technical reports.
- 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)	37	12	26.2%	26-28%
D	Program Requirements (specialization)	57	19	40%	28-30%
G	+ Optional (Institution character-identifying subjects)				16-4%
E	Training	-	-	-	3-5%
F	Projects	6	-	4.2%	3-5%
	Total	141	46	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.

