



The Higher Institute for Specialized Technological Studies Computer Science Department

Bachelor of Computer Science Credit Hours Program Specification Version 2

2023 – 2024 Bylaw 2022



I. Intended Learning Outcomes (ILOs)

a) Knowledge and Understanding

By the end of this program the graduate should be able to:

a.1	Recognize the essential ideas, and theories of mathematics and basic science relevant to computer science. (General NARS: 6.2.1.1)
a.2	Use principles of computing technology to model and design of computer-based systems bearing in mind the trade-offs. (General NARS: 6.2.1.2)
a.3	Demonstrate strong knowledge of fundamentals of programming, the design, implementation, and assessment of computer-based systems. (General NARS: 6.2.1.3)
a.4	Define criteria and specifications appropriate to specific problems, and plan strategies for their solution. (General NARS: 6.2.1.4)
a.5	Identify the degree to which a computer-based system satisfies the requirements set forth for both its present use and its potential future development. (General NARS: 6.2.1.5)
a.6	Recognize the current and underlying technologies that support computer processing and inter- computer communication (General NARS: 6.2.1.6)
a.7	Describe the principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results. (General NARS: 6.2.1.7)
a.8	Comprehend the fundamentals of legal, professional, ethical issues, and moral aspects of the exploitation of computing as they relate to the fields of computing and information. (General NARS: 6.2.1.8)
a.9.	Recognize the moral, ethical, and professional issues associated with the exploitation of computer technology, and follow the proper legal, ethical, and professional guidelines specific to the computing and information industries. (General NARS: 6.2.1.9)
a.10	Utilize recent advancements in computing and information research. (General NARS: 6.2.1.10)
a.11	Show a critical understanding of requirements and real-world practical constraints of computer- based systems. (General NARS: 6.2.1.11)
	• <u>Specific ILOS:</u>
a.12	Explain the concepts and principles of statistical and mathematical analysis, including linear algebra, discrete mathematics and statistics. (Computer Science NARS: 2.4.1.1)
a.13	Understand and trace the execution of programs written in high-level programming language. (Computer Science NARS: 2.4.1.2)



a.14	Utilize the appropriate mathematical principles to develop predictive, prescriptive machine learning models and design the algorithms. (Computer Science NARS: 2.4.1.3)
a.15	Order and interpret data using both qualitative and quantitative methods. (Computer Science NARS: 2.4.1.4)
a.16.	Know and understand the fundamentals and techniques of several application areas informed by the research directions of computer science. (Computer Science NARS: 2.4.1.5)
a.17	Demonstrate strong knowledge of fundamentals of Data Warehousing, data structures and algorithms. (Computer Science NARS: 2.4.1.6)
a.18.	Demonstrate a critical understanding of the principles of the artificial intelligence, image Processing, and Pattern Recognition. (Computer Science NARS: 2.4.1.6)
a.19	Recognize the basic concepts of computer science, such as operating systems, compilers, parallel and distributed processing, systems, real time Systems, hardware and software architectures, software engineering principles and methodologies, and software tools. (Computer Science NARS: 2.4.1.7)
a.20	Show a critical understanding of the principles of image Processing, Machine Learning, Neural Networks, Virtual Reality, computer networks, Natural language processing, data mining, databases, computer graphics, cloud computing, computer security and compiler theory (Computer Science NARS: 2.4.1.8)
a.21	Understand and apply certain techniques that can be gained by choosing advanced topics including hardware systems design, object-oriented analysis and design, and artificial intelligence, parallel and concurrent computing. (Computer Science NARS: 2.4.1.8)



b) Intellectual Skills

By the end of bachelor of Computer Science program the graduate should be able to:

b.1	Analyze and evaluate a range of options in producing a solution to an identified problem. (NARS 6.2.2.1)
b.2	Apply the concepts, principles, theories and practices underpinning computing as an academic discipline. (NARS 6.2.2.2)
b.3	Define and assess criteria to measure the appropriateness of a computer system for its current deployment and future evolution, and to interpret the results thereof. (NARS 6.2.2.3)
b.4	Analyze, suggest, and assess alternative computer systems and processes considering restrictions and quality constraints. (NARS 6.2.2.4)
b.5	Construct concepts, plans, and designs for the presentation of computing systems by employing logical and well-reasoned arguments. (NARS 6.2.2.5)
b.6	Interpret test findings to evaluate how well computer systems work. (NARS 6.2.2.6)
b.7	Make decisions that take into account the environmental impact, safety, quality, dependability, and balance of costs and benefits. (NARS 6.2.2.7)
b.8	Have comprehensive, in-depth knowledge regarding crucial issues (professional, legal, moral, and ethical) in computer science. (NARS 6.2.2.8)
b.9	Assess research articles in various fields of expertise. (NARS 6.2.2.9)
	• <u>Specific ILOS:</u>
b.10	Identify traditional and non-traditional problems and formulate solutions for them with observing results. (Computer Science NARS: 2.4.2.1)
b.11	Compare between different (algorithms, methodologies, methods, etc.). (Computer Science NARS: 2.4.2.2)
b.12	Classify the different scientific approaches (methods, methodologies and algorithms). (Computer Science NARS: 2.4.2.3)
b.13	Identify attributes, elements, relationships, patterns, primary concepts, and errors. (Computer Science NARS: 2.4.2.4)
b.14	Compare and summarize the proposed solutions of computing problems and their results. (Computer Science NARS: 2.4.2.5)
b.15	Restrict characteristics of solution or its methodologies that impacted the interpretation of their findings. (Computer Science NARS: 2.4.2.6)
b.16	Create measurable, realistic, and time-bound criteria to evaluate solutions and their performance, aligning with the problem statement, goals, and stakeholder expectations. (Computer Science NARS: 2.4.2.7)



b.17	Generate a range of solutions for solving a significant computational problem that is ethical, feasible, and adds value, and which are based on pertinent background research and appropriate design. (Computer Science NARS: 2.4.2.8)
b.18	Create and/or justify designs of software systems to solve problems containing a range of commercial and industrial constraints. (Computer Science NARS: 2.4.2.9)
b.19	Generate a creative design for a software system using appropriate design principles and patterns while considering the principles of security by design and quality assurance. (Computer Science NARS: 2.4.2.10)



c) Practical and Professional Skills

By the end of bachelor of Computer Science program the graduate should be able to:

c.1	Operate computing equipment efficiently, taking into account its logical and physical properties, its capabilities, and limitations. (NARS 6.2.3.1)
c.2 .	Implement comprehensive computing knowledge and skills in projects and in deployment of computers to solve position practical problems. (NARS 6.2.3.2)
c.3	Apply tools and techniques for the design and development of applications. (NARS 6.2.3.3)
c.4	Utilize your retrieval skills for computing knowledge in the industry, environment, and computing community. (NARS 6.2.3.4)
c.5	Use technological repositories, internet resources, and library-based materials to acquire a variety of basic research skills. (NARS 6.2.3.5)
c.6	Design, execute, update, repair, and enhance software systems after they have been deployed. (NARS 6.2.3.6)
c.7	Examine the consequences, dangers, and safety features associated with using computing equipment in a specific environment. (NARS 6.2.3.7)
c.8	Handle a large amount of heterogeneous data, evaluate risk, and come up with results. (NARS 6.2.3.8)
	• <u>Specific ILOS:</u>
c.9	Employ suitable web-based tools and systems, database systems, design techniques, and programming languages in designing software applications. (Computer Science NARS: 2.4.3.1)
c.10	Implement appropriate programming techniques and artificial intelligence algorithms. (Computer Science NARS: 2.4.3.1)
c.11	Communicate effectively in a variety of professional contexts through verbal, written, and visual methods. (Computer Science NARS: 2.4.3.2)
c.12	Acquire and manage information utilizing web resources and scientific publications. (Computer Science NARS: 2.4.3.3)
c.13	Make and present workshops with a high level of professionalism. (Computer Science NARS: 2.4.3.4)
c.14	Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material. (Computer Science NARS: 2.4.3.5)
c.15	Prepare technical reports and a dissertation to a professional standard, demonstrate advanced computer literacy, and utilize IT abilities. (Computer Science NARS: 2.4.3.6)



c.16	Create an innovative and creative design for computer-based systems using appropriate design principles and patterns. (Computer Science NARS: 2.4.3.7)
c.17	Use computing theory and programming principles for practical software design and development. (Computer Science NARS: 2.4.3.7)
c.18	Assess systems based on the general quality characteristics and potential trade-offs that are offered in the given problem. (Computer Science NARS: 2.4.3.8)
c.19	Apply knowledge of computing, mathematics, software development, networking and management principles, and methodologies within technical domains. (Computer Science NARS: 2.4.3.9)
c.20	Analyze information in all its forms, including text, images, sound, and video, by using the concepts of efficient information management, information organization, and information retrieval techniques. (Computer Science NARS: 2.4.3.9)
c.21	Analyze the factors affecting the confidentiality of information to ensure the availability and integrity of information security, including the physical equipment, software, and policies used, as well as the ability to analyze these factors in designing applications. (Computer Science NARS: 2.4.3.9)
c.22	Employ the concepts of human-computer interaction for assessing and developing a variety of resources, such as web pages, multimedia systems, and user interfaces. (Computer Science NARS: 2.4.3.10)
c.23	Estimate any potential dangers or safety issues that arise from using computer technology in a particular environment. (Computer Science NARS: 2.4.3.11)
c.24	Use software development and documentation tools efficiently, paying special attention to comprehending the entire process of employing computers to solve practical problems. (Computer Science NARS: 2.4.3.12)
c.25	Adapt and extend computational skills to new contexts as needed in their path (e.g., using a different editor/IDE, finding and using appropriate code libraries, learning a new programming language, or computational workflow). (Computer Science NARS: 2.4.3.12)



d) General and Transferable Skills

By the end of bachelor of Computer Science program the graduate should be able to:

d.1	Manage one's own lifelong learning and ongoing professional development through using a variety of learning resources efficiently (NARS 6.2.4.1) (NARS 6.2.4.8)
	variety of learning resources efficiently: (177RS 0.2.4.1) (177RS 0.2.4.0)
d.2	Collaborate effectively within multidisciplinary team. (NARS 6.2.4.2)
d.3	Work in stressful environment and within constraints. (NARS 6.2.4.2)
d.4	Lead and motivate individuals. (NARS 6.2.4.2)
d.5	Search for different scientific terminologies related to computing practices and adopt lifelong self-learning. (NARS 6.2.4.3)
d.6	Prepare and deliver reports for a variety of audiences, such as management, technical, users, industry, or the academic community, using a suitable combination of tools and aids. (NARS 6.2.4.4)
d.7	Demonstrate suitable numeracy skills in understanding and presenting cases involving a quantitative dimension. (NARS 6.2.4.5)
d.8	Communicate effectively by oral, written and visual means. (NARS 6.2.4.6)
d.9	Communicate effectively with team members, managers and costumers. (NARS 6.2.4.6)
d.10	Work effectively as an individual and as a member of team and respect teamwork. (NARS 6.2.4.6)
d.11	Manage tasks and resources. (NARS 6.2.4.7)
d.12	Demonstrate efficient IT capabilities. (NARS 6.2.4.7)