Higher Institute for Computers & Information Technology
Department of Computer Science

Computer Science
B.Sc. Program Specification
Semester System

Version 2.2

Academic Year 2022-2023

الإعتماد : محضر مجلس القسم رقم (11) بتاريخ 2022/8/10
محضرمجلس إدارة المعهد رقم (2) بتاريخ 2023/1/18

Signatures
Coordinator: **Name: A.Prof.Dr. Abd El-Latif Hussein** **Signature:**
Head of Department: **Name: A.Prof. Dr. Ahmed El Abbassay** **Signature:**

Revision History

Date	Version	Description	Author
1 / 07/ 2007	V 1.0	**Initial version**	Dr. Ahmed Elabbassy
15/ 01/ 2011	V1.1	**To include the comments of the external Evaluator (dated 7/12/2010)**	Dr. Ahmed Elabbassy
15/ 08/ 2011	V 1.2	**To include the comments of NAQAAE* (dated 14 / 06/ 2011)-اعتماد المعايير الأكاديمية**	Dr. Ahmed Elabbassy
15/08/2016	V1.3	**زيارة الاعتماد الاولى** **تلبية ملاحظات زيارة الاعتماد – تقرير المراجعة الخارجية بتاريخ 2014/6/14 موضح فى ملحق رقم** (5) **To include the comments of NAQAAE* (dated 14 / 06/ 2014)-**	Dr. M. Elzwedy
15/08/2019	V1.4	**الحصول على شهادة الاعتماد المؤسسى فى 2018/5** **تلبية ملاحظات زيارة الاعتماد – تقرير المراجعة الخارجية بتاريخ 2017/12/10 موضح فى ملحق رقم (6)** **To include the comments of NAQAAE*** (**dated 10/12/2017**)-	Dr. M.Hussain
15/10/2020 **Program Specification** **(2020-2021)**	V2	**التعامل مع كوفيد 19 والاعتماد على نظم التعليم الالكترونى.** **ادخال نظام التعليم الهجين وتنفيد خطة تطوير وتحسين البرنامج (تقرير البرنامج للعام الجامعى 20/19)** - **To include new learning methods blended learning to cope with COVID-19 pandemic**	Dr. M.Hussain
15/8/2021 **Program Specification** **(2021-2022)**	**V2.1**	**تطوير نظام التعليم الهجين وتنفيد خطة تطوير وتحسين البرنامج (تقرير البرنامج للعام الجامعى 21/20)** **خطة تطوير البرنامج لمواكبة متطلبات سوق العمل ومستجدات التخصص موضح فى ملحق رقم (7)**	Dr. Abd Allatif Hussain
10/8/2022 **Program Specification** **(2022-2023)**	**V2.2**	**تنفيد خطة تطوير وتحسين البرنامج (تقرير البرنامج للعام الجامعى 22/21) وملاحظات المراجع الخارجى** **To include:** - **Formative assessment methods for more effective interaction with students** - **To add Program vision and mission** - **ILO's verbs update** - **Add matrix Program ILO's vs Course** - **Add matrix Teaching and Learning methods vs. Program Course**	Dr. Abd Allatif Hussain

*** NAQAAE: National Authority for Quality Assurance and Accreditation of Education**

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A. BASIC INFORMATION

1. Program Title	**B.Sc. of Computer Science**
2. Program Type	**Single**
3. Department	**Computer Science**
4. Coordinator	**A.Prof.Dr. Abd El-Latif Hussein**
5. External Evaluator	**Professor Mahmoud Gadallah (review date 24/7/2022)** **Professor Fatma Emara (review date 2021)** **Professor Ali Fahmy (review date 2017)** **Professor Ibrahim El-Hennawy (review date 2014)**
6. Last Date of Approval	**October 2022**

B. PROFESSIONAL INFORMATION

1. Program aims

Program Vision

We look forward to being among the distinguished programs at the national and regional level in the field of computer science, with a continuous commitment to supporting scientific research and community development.

Program Mission

Preparing a knowledgeable, skilled and professional graduate to meet the needs of the labor market locally and regionally in the field of computer science, developing the educational and administrative environment to keep abreast of scientific and technological developments, and the continuous development of scientific research and community and environmental services in a way that supports the institute's competitive position and achieves a high level of satisfaction for all societal parties.

Department & Program Aims

The overall aims of the Computer Science Department are:

1. Preparing specialized graduates to meet the needs of the labor market and able to compete locally and internationally.
2. Create a supportive educational and research environment.
3. Continuous development of the skills of teaching staff and the supporting staff.
4. Build effective collaboration with the community.

The Computer Science Program aims are articulated through statements of graduate attributes in compliance with NARS:

- Attributes of Computing and Information Programs Graduates; and
- Attributes of Computer Science Graduate.

From graduate attributes perspectives, aims of our BSc Degree program in Computer Science are:

1.	to develop, in a flexible and progressive structure, students' knowledge and understanding of fundamental areas of computer science such as: algorithms, design and analysis, computational theory, computer architecture and software-based systems, with the ability to use this knowledge to devise, specify, design, implement, test, document and critically evaluate computer-based systems.
2.	To provide students with a sound understanding and how to apply mathematics, science to real world problems; as well as to analyze and interpret data.
3.	To provide students with the analytic skills necessary to effectively evaluate the relative merits of software and computer systems, and algorithmic approaches.
4.	To provide students with a sound understanding and how to apply a wide range of principles and tools of software engineering, such as design methodologies, choice of algorithm, language, software libraries and user interface technique.
5.	To equip students with state-of-the-art knowledge and understanding of algorithms and data structures, computer organization and architecture, programming language concepts, networks, artificial intelligence, graphics, natural language processing, data mining, human computer interfaces, and databases, and identify and define the computing requirements for its solution.
6.	To give students the opportunity to deepen their technical expertise in designing, implementing, and evaluating a computer-based systems, process, component or program.
7.	To develop the students' ability to use knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.
8.	To prepare students for working effectively in teams in designing and implementing software systems and to equip them with management skills to be able to carry out a work plan with minimal supervision
9.	To develop the students understanding of the key ethical, moral, legal issues affecting computer science and their responsibilities as computer science professionals.
10.	To develop the students' ability to communicate, present and document ideas and concepts clearly and in an organized manner.
11.	To equip the students with independent learning skills and encourage an appreciation of the importance to computer science professionals of continuing professional development and lifelong learning.

B. PROFESSIONAL INFORMATION

2. Intended learning outcomes (ILOs)

The program provides students with opportunities to develop and demonstrate knowledge and understanding, intellectual, professional and practical and transferable skills as listed below. These outcomes have been developed with reference to the National Academic Reference Standards (NARS) for COMPUTER SCIENCE, 1st Edition, October 2010 benchmark statement.
Learning outcomes are statements on what successful students should achieve as the result of learning. They threshold statements of achievement and are linked to the knowledge, understanding and skills that a student will have gained on successfully completing a program

2. Intended learning outcomes (ILOs)	
a- Knowledge and understanding	On successful completion of this program, graduates should be able to:
	A1. Understand the essential mathematics relevant to computer science. [NARS CS A1]
	A2. Use high-level programming languages. [NARS CS A2]
	A3. Show a critical understanding of Requirements, practical constraints and computer-based systems [NARS GENERAL11]
	A4. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics. [NARS CS A3]
	A5. Interpreting and analyzing data qualitatively and/or quantitatively. [NARS CS A4]
	A6. Know and understand the principles and techniques of a number of application areas informed by the research directions of computer science. [NARS GENERAL K10], [NARS CS A5]
	A7. Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition. [NARS CS A6]
	A8. Understand fundamental topics in computer systems, including hardware architectures and operating systems. [NARS CS A7]
	A9. Understand fundamental topics in computer science, including software architectures, software engineering principles and methodologies, and software tools. [NARS CS A7]
	A10. Select advanced topics to provide a deeper understanding of some aspects of the hardware systems design, operating systems, computer security and compiler theory. [NARS CS A8]
	A11. Select advanced topics to provide a deeper understanding of some aspects of object-oriented analysis and design, and software engineering. [NARS CS A8]
	A12. Select advanced topics to provide a deeper understanding of some aspects of the artificial intelligence, image processing, and computer graphics and animation. . [NARS CS A8]
	A13. Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems. [NARS GENERAL K1]
	A14. Demonstrate strong knowledge of fundamentals of data structures and algorithms. [NARS CS A8]
	A15. Show a critical understanding of the broad context within computing including issues such as quality, reliability, enterprise, employment law, and management, economics and accounting principles. [NARS GENERAL K8]
	A16. Provide a deeper understanding of legal, professional, ethical issues and moral aspects of the exploitation of computing. [NARS GENERAL K9]
	A17. Determine the tools, practices and methodologies used in the specification. [NARS GENERAL K3]
	A18. identify the methods used in defining and assessing criteria for measuring the extent to which a computer system is appropriate for its current deployment and future evolution. [NARS GENERAL K5]
	A19. Recognize the current and underlying technologies that support computer processing and inter-computer communication. [NARS GENERAL K6]
	A20. Describe of the principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results. [NARS GENERAL K7]
	A21. Identify Modelling and design techniques of computer-based systems bearing in mind the trade-offs. [NARS GENERAL K2]
	A22. Define the criteria and specifications appropriate to specific problems, and plan strategies for their solution [NARS GENERAL K4]

2. Intended learning outcomes (ILOs)	
b- Intellectual skills	On successful completion of this program, graduates should be able to:
	B1. Define traditional and non-traditional problems, set goals towards solving them, and observe results. [NARS CS B1]
	B2. Perform comparisons between (algorithms, methods, techniques, etc.). [NARS CS B2]
	B3. Perform classifications of (data, results, methods, techniques, algorithms, etc.). [NARS CS B3]
	B4. Identify attributes, components, relationships, patterns, main ideas, and errors. [NARS CS B4]
	B5. Summarize the proposed solutions and their results. [NARS CS B5]
	B6. Restrict solution methodologies upon their results[NARS CS B6]
	B7. Establish criteria, and verify solutions. [NARS CS B7]
	B8. Identify a range of solutions and critically evaluate and justify proposed design solutions. [NARS CS B8]
	B9. Solve computer science problems with pressing commercial or industrial constraints[NARS CS B9]
	B10. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints. [NARS CS B10]
	B11. Use investigative skills to research new and novel aspects of their work [NARS GENERAL I9]
	B12. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application). [NARS GENERAL I7]
	B13. Analyze and evaluate a range of options in producing a solution to an identified problem. [NARS GENERAL I4]
	B14. Perform problem analysis from written descriptions; derive requirements specifications from an understanding of problems (analysis, synthesis). [NARS GENERAL I1]
	B15. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline. [NARS GENERAL I2]
	B16. 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 GENERAL I3]
	B17. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences. [NARS GENRAL I5]
	B18. Evaluate the results of tests to investigate the functionality of computer systems. [NARS GENERAL I6]
	B19. Address and apply professional, moral and ethical issues within the discipline. [NARS GENERAL I8]

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2. Intended learning outcomes (ILOs)	
c- Professional and practical skills	On successful completion of this program, graduates should be able to:
	C1. Use appropriate programming languages and design methodologies. [NARS CS C1]
	C2. Use appropriate web-based systems, tools and design methodologies. [NARS CS C1]
	C3. Use appropriate knowledge and database systems. [NARS CS C1]
	C4. Perform independent information acquisition and management, using the scientific literature and Web sources. [NARS CS C3,5]
	C5. Specify, design, and implement and manage computer-based systems. [NARS CS C7]
	C6. Evaluate systems in terms of general quality attributes and possible trade-offs presented within the given problem. [NARS CS C8]
	C7. Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video[NARS CS C9], [NARS GENERAL P4]
	C8. Apply the principles of human-computer interaction to the evaluation and construction of a wide range of materials including user interfaces, web pages, and multimedia systems. [NARS CS C10]
	C9. Identify any risks or safety aspects that may be involved in the operation of computing equipment within a given context. [NARS CS C11], [NARS GENERAL P7]
	C10. Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems. [[NARS CS C12], [NARS GENERAL P3]
	C11. Make effective use of general computing facilities, plan and manage a project to complete within budget and schedule. [NARS GENERAL P1]
	C12. Appreciate and manage the need for continuing professional development in recognition of the need for lifelong learning. [NARS CS C3,5]
	C13. Communicate effectively by oral, written and visual means [NARS CS C2]
	C14. Operate computing equipment efficiently, taking into account its logical and physical properties. [NARS GENERAL P1]
	C15. Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy [NARS CS C6,13]
	C16. Apply tools and techniques for the design and development of applications. [NARS GENERAL P2]
	C17. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material [NARS GENERAL P5]
	C18. Handle a mass of diverse data, assess risk and draw conclusions [NARS GENERAL P8]
	C19. Prepare and present seminars to a professional standard [NARS CS C4]

2. Intended learning outcomes (ILOs)	
d- General and transferable skills	On successful completion of this program, graduates should be able to:
	D1. Communicate effectively by oral, written and visual means. [NARS GENERAL T6]
	D2. Work effectively as an individual and as a member of a team. [NARS GENERAL T2]
	D3. Collaborate effectively within multidisciplinary team. [NARS GENERAL T2]
	D4. Work in stressful environment and within constraints. [NARS GENERAL T2]
	D5. Demonstrate efficient IT capabilities. [NARS GENERAL T7]
	D6. Lead and motivate individuals. [NARS GENERAL T2]
	D7. Manage tasks and resources. [NARS GENERAL T2]
	D8. Search for information and adopt life-long self-learning. [NARS GENERAL T3]
	D9. Manage one's own learning and development. [NARS GENERAL T1]
	D10. Communicate effectively with team members, managers and costumers. [NARS GENERAL T6]
	D11. Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension. [NARS GENERAL T5]
	D12. 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 [NARS GENERAL T4]

e- **Appendix A1.1 illustrates the Map of Program aims against Program ILOs**

B. PROFESSIONAL INFORMATION

3. Academic Standards

3.a External references for standards (Benchmarks)

a.1 المعايير القومية القياسية الأكاديمية لقطاع الحاسبات والمعلومات
National Academic Reference Standards (NARS) for COMPUTER SCIENCE, 1st Edition , October 2010
https://admin.nagaae.eg/api/v1/archive/download/4787

b- Appendix A1.2 illustrates the matching between NARS and Program ILOs.

The Academic standards were approved by the department council on: 2/5/2014 and by the institute board of directors- minutes No. (7) dated 21/5/2014 .

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B. PROFESSIONAL INFORMATION

4. Curriculum Structure and Contents

4.a Program duration	Four Years - 8 Semesters
4.b Program structure	
4.b.1 No. of hours per week	First Semester: **Lectures:** 64 **Lab. /Exercise**: 67 **Total:** 131 Second Semester: **Lectures:** 65 **Lab. /Exercise**: 70 **Total:** 134
4.b.2 No. of hours:	**Compulsory :** 227 **Elective :** 38
4.b.3 No. of hours of Math. & basic sciences courses	**No.** 49 **%** 18.5
4.b.4 No. of hours of courses of social sciences	**No.** 20 **%** 7.6
4.b.5 No. of hours of specialized courses	**No.** 196 **%** 73.9
4.b.6 Practical/Field Training: Programming & application skills	No compulsory field training is included in the program (Will be in the new regulations to be applied in 23/24

4.b.7 Compliance with NARS
Curricula content by subject area
Total Number of Hours: 265

	Subject Area	NARS Requirements Tolerance %	CS Program	
			Hours	%
A	Humanities, ethical and social sciences (Univ. Req.)	8-10	20	7.6
B	Mathematics and basic sciences	16-18	49	18.5
C	Basic computing sciences (institution req.)	26-28	76	28.7
D	Applied computing Sciences (specialization)	28-30	84	31.6
E	Training*	3-5	*	*
F	Projects	3-5	12	4.5
	Subtotal	84-96	241	90.9
G	Optional (Institution character-identifying subjects)	16-4	24	9.1
	Total	100	265	100%

*** لا يوجد باللائحة الحالية (بنظام الفصول الدراسية) برنامج إجبارى للتدريب الميدانى . وسوف يتم تطبيق ذلك فى اللائحة الجديدة (بنظام الساعات المعتمدة) التى تم إعدادها بواسطة المعهد و اعتمادها من وزارة التعليم العالى ويتم تطبيقها بدءا من العام الجامعى 24/23 . وفى الوضع الحالى يتم تدريب الطلبة من خلال شركات تدريب متخصصة يتم توقيع اتفاقيات تعاون معها ويكون التدريب إختياريا.**

*** اتخذ المجلس الأكاديمى قرارا بدءا من العام الجامعى 22/21 بأن يكون التدريب الميدانى فى اللائحة الحالية (بنظام الفصول الدراسية) متطلب تخرج وربطه بمقرر مشروع التخرج وإضافة 10% من درجات مشروع التخرج على إجتياز الطالب للتدريب الميدانى.**

B. PROFESSIONAL INFORMATION

5. Programme Courses

5.1 First year – First Semester

Code No.	Course title	Cat*	No. of Units	No of hours / week			
				L**	E**	P**	
1101	**Introduction to computers & application**	**C**	**1**	**3**	**2**	**2**	
1102	**Discrete structure**	**C**	**1**	**3**	**2**	**-**	
1103	**Physics**	**C**	**1**	**3**	**2**	**2**	
1104	**Mathematics (1)**	**C**	**1**	**3**	**2**	**-**	
1105	**English (1)**	**C**	**1**	**3**	**2**	**-**	
	Total			**15**	**10**	**4**	**29**

* C: Compulsory, E: Elective ** L: Lecture, P: Practical, E: Exercise

5.2 First year – Second Semester

Code No.	Course title	Cat*	No. of Units	No of hours / week			
				L**	E**	P**	
1201	**Structured Programming**	**C**	**1**	**3**	**-**	**4**	
1202	**Computer Packages**	**C**	**1**	**2**	**-**	**5**	
1203	**Electronics**	**C**	**1**	**3**	**3**	**-**	
1204	**Mathematics (2)**	**C**	**1**	**3**	**2**	**-**	
1205	**English (2)**	**C**	**1**	**3**	**2**	**-**	
1206	**Operations Research**	**C**	**1**	**3**	**3**	**-**	
	Total			**17**	**10**	**9**	**36**

* C: Compulsory, E: Elective ** L: Lecture, P: Practical, E: Exercise

B. PROFESSIONAL INFORMATION

5. Programme Courses							
5.3 Second year – First Semester							
Code No.	Course title	Cat*	No. of Units	No of hours / week			
				L**	E**	P**	
2101	**Mathematics (3)**	**C**	**1**	**3**	**2**	**-**	
2102	**Data structures**	**C**	**1**	**3**	**2**	**2**	
2103	**Object oriented programming**	**C**	**1**	**3**	**-**	**4**	
2104	**Logic design**	**C**	**1**	**3**	**-**	**4**	
2105	**Humanities**	**E**	**1**	**3**	**1**	**-**	
	Total			**15**	**5**	**10**	**30**

* C: Compulsory, E: Elective ** L: Lecture, P: Practical, E: Exercise

5.4 Second year – Second Semester							
Code No.	Course title	Cat*	No. of Units	No of hours / week			
				L**	E**	P**	
2201	**System analysis**	**C**	**1**	**3**	**-**	**3**	
2202	**File organization**	**C**	**1**	**3**	**1**	**2**	
2203	**Probability & statistics**	**C**	**1**	**3**	**4**	**-**	
2204	**Computer organization**	**C**	**1**	**3**	**2**	**2**	
2205	**Humanities**	**E**	**1**	**3**	**1**	**-**	
2206	**Pattern recognition**	**C**	**1**	**3**	**1**	**2**	
	Total			**18**	**9**	**9**	**36**

* C: Compulsory, E: Elective ** L: Lecture, P: Practical, E: Exercise

5. Programme Courses							
5.5 Third year – First Semester							
Code No.	Course title	Cat*	No. of Units	No of hours / week			
				L**	E**	P**	
3101	**Data base systems**	**C**	**1**	**3**	**-**	**3**	
3102	**Operating system**	**C**	**1**	**3**	**1**	**2**	
3103	**System design**	**C**	**1**	**3**	**-**	**3**	
3104	**Human computer interfaces**	**C**	**1**	**3**	**1**	**2**	
3105	**System level programming**	**C**	**1**	**3**	**-**	**3**	
3106	**Computer modelling and simulation**	**E**	**1**	**3**	**-**	**3**	
	Total			**18**	**2**	**16**	**36**

* C: Compulsory, E: Elective ** L: Lecture, P: Practical, E: Exercise

5.6 Third year – Second Semester							
Code No.	Course title	Cat*	No. of Units	No of hours / week			
				L**	E**	P**	
3201	**Computer networks**	**C**	**1**	**3**	**3**	**-**	
3202	**Computer graphics**	**C**	**1**	**3**	**-**	**3**	
3203	**Software engineering (1)**	**C**	**1**	**3**	**-**	**3**	
3204	**Logic programming**	**C**	**1**	**3**	**-**	**3**	
3205	**Analysis & design of algorithms**	**E**	**1**	**3**	**1**	**2**	
3206	**Human rights**	**E**	**1**	**2**	**-**	**-**	
	Total			**17**	**4**	**11**	**32**

* C: Compulsory, E: Elective ** L: Lecture, P: Practical, E: Exercise

5. Programme Courses							
5.7 Fourth year – First Semester							
Code No.	Course title	Cat*	No. of Units	No of hours / week			
				L**	E**	P**	
4101	**Artificial intelligence**	**C**	**1**	**3**	**-**	**3**	
4102	**Network programming**	**C**	**1**	**3**	**-**	**3**	
4103	**Software engineering (2)**	**C**	**1**	**3**	**-**	**3**	
4104	**Computer security**	**C**	**1**	**3**	**-**	**3**	
4105	**Computer vision**	**E**	**1**	**3**	**-**	**3**	
4106	**Project**	**C**	**1**	**1**	**-**	**5**	
	Total			**16**	**-**	**20**	36

* C: Compulsory, E: Elective ** L: Lecture, P: Practical, E: Exercise

5.8 Fourth year – Second Semester							
Code No.	Course title	Cat*	No. of Units	No of hours / week			
				L**	E**	P**	
4201	**Expert systems**	**C**	**1**	**3**	**-**	**3**	
4202	**Multimedia**	**C**	**1**	**3**	**-**	**3**	
4203	**Compiler theory**	**E**	**1**	**3**	**-**	**3**	
4204	**VLSI**	**E**	**1**	**3**	**-**	**3**	
4106	**Project**	**C**	**1**	**1**	**-**	**5**	
	Total			**13**	**-**	**17**	30

* C: Compulsory, E: Elective ** L: Lecture, P: Practical, E: Exercise

5.9 Appendix A1.4 illustrates Program ILOs and Program Courses cross references.

5.10 Contents of Program Courses

Appendix (2) outlines the contents of Program Courses

B. PROFESSIONAL INFORMATION

6. Program admission requirements

Registration to the department requires the student to have the General Egyptian Secondary Education Certificate or equivalent certificates or degrees approved by the Egyptian ministry of higher education with qualifying grades according to the guidelines put annually by the Ministry of higher education.

7. Regulations for progression and program completion

- (For the students to be transferred from one academic year to the next, he/she is required to have successfully passed in all subjects. However, the student may still be transferred if he/she has failed in not more than two basic subjects from the same academic year or from previous years.
- In such cases, students “carrying" subjects from one year to the next should re-sit for their "failed" subjects in their proper respective semesters.
- Final year students who have failed in a maximum of two basic complementary ones in that yea or from previous years can re-sit for their exams in those subjects in September of the same year Should the student failed again, he/she has to re-sit for his/her exams in those subjects in thei proper respective semesters thereafter as many times as necessary until he/she succeeds).
- Marks from the first year to the fourth year are weighted so that determination of overall marks of the degree.
- The final overall marks determine the degree classification as follows:

  • Less than 50% Fail
  • At least 50% and less than 65% Pass
  • At least 65 and less than 75 % Good
  • At least 75 and less than 85 % very good
  • At least 85 and more Excellent

7.1 First Year Semester1, and 2	Moved to second Semester Passing in all courses of the year or fail in not more than two compulsive subjects
7.2 Second Year Semester 1, and 2	Passing in all courses of the year but at least two related to first and second years
7.3 Third Year Semester 1, and 2	Passing in all courses of the year but at least two related to first, second, and/or third years
7.4 Fourth Year Semester 1, and 2	Passing in all courses or fail in not more than two compulsive subjects. In this case, the student is allowed to enter a September Exam in the same year

B. PROFESSIONAL INFORMATION

7. Regulations for progression and program completion

7.5 Enrollment opportunities

By laws and Regulations for Undergraduate Students "Enrollment opportunities/or "regular" and "external" students:

Academic year	Enrollment opportunities	
	Regular students	**External students**
First	Two opportunities	None
Second	Two opportunities	Two opportunities
Third	Two opportunities	Two opportunities
Fourth	Two opportunities	Number of subjects, he/she would be allowed to re-sit for the exam the subjects he/she has failed in indefinitely until He/she is graduated.

- Once the student exhausts the number of opportunities of a being a regular" student, he/she becomes an "external" student for a certain number of times according to the above table.
- Once an "external" student in a certain year succeeds in his/her exams for that year to allow him/her to be transferred to the following year, he/she automatically becomes registered as a regular student again.

B. PROFESSIONAL INFORMATION

8- Evaluation of program intended learning outcomes

Evaluator	Tool	Sample
1- Senior students	Questionnaire	Refer to Quality Unit Manual/Reports and Program Reports
2- Alumni	Questionnaire	
3- Stakeholders (Employers)	Questionnaire	
4-External Evaluator(s)	Review Report	
5- Other	-	-

B. PROFESSIONAL INFORMATION

9- Teaching, learning and Assessment

9-1 Teaching & learning methods

- Various teaching methods are used.
- To support the teaching process, the instructors are using the academy portal and the IT-based media like PowerPoint presentations.
- Students are encouraged to participate in group work and open discussions.
- Students will be provided with opportunities to sample the learning content of the Computer Science program. An online induction will ensure that they are prepared for study and are familiar with the learning environment and sources of support during their student journey.
- All students will have access to the Virtual learning environment, learning content, tools and activities related to their chosen program of study. Students will be able to select from two modes of study: web supported learning (online) or institution supported learning (Face To Face).
- The learning content will be designed to provide students with opportunities to engage, and encourage reflective and deep learning, with accessibility a key feature to enable all students to study across a range of mobile and media channels using the academy portal.
- All students will have access to the VLE (Virtual Learning Environment), with learning support and tools enabling them to monitor their progress, assessing fulfillment of learning outcomes and development of skills-based outcomes throughout the curriculum. The learning environment will provide a framework for the level of support selected by students, which involves local and online tuition services.
- To support the teaching process due to covid-19 pandemic the instructors are using the academy portal to upload lectures videos, labs videos and exchange assignments through academic mails.
- To support the teaching process the instructors are using new teaching techniques in sessions to encourage students like problem solving and inductive learning
- The design, development and delivery of this program will be supported with training for:
  - Academic teams involved in the development of the materials and assessment.
  - Module Leaders.

Teaching and learning methods.

Teaching and learning Strategies	Teaching and learning methods
Active Learning	Lectures
	Tutorial Exercises
	Practical Lab
	Discussions
Self – Learning strategy	Reading material
	Websites search
	Research and reporting
	Self-studies
Experimental strategy	Group work
	Presentation
Problem solving strategy	Problem solving/problem solving learning based
	Case study
Synchronous E-Learning	Virtual lab
	Virtual class
	Chat Room
	Video lectures
Asynchronous E-Learning	E-Learning
Blended Learning	Combination between methods of Synchronous E-Learning and Asynchronous E-Learning

In addition to the following:

- Supervision of Course practical project
- Feedback and guidance

Appendix A1.5 Teaching and Learning methods vs. Program Courses

9-2 Assessment

Assessment

In line with our current General Regulations, the Academy may offer students alternative assessments where necessary. This includes holding online timed assessments in place of written quizzes, which are usually held at the academy portal.

- The system is in compliance with the NARS General Principles and guidelines for Effective Assessment
- Assessment of students is based, in the first place, upon examinations.
- A variety of assessment methods are adopted based around traditional academic techniques such as practical and essay-based coursework and exams. Assessment shall include opportunity for self-reflection and contain an element of performance monitoring to ensure student's perform to their abilities and will make full use of the Academy virtual learning environment.
- The semester work is assessed based on assignments, mid-term exam. Quizzes, lab. Work, seminar presentations, discussions and project reports.
- The coursework submission constitutes multiple staged deliverables including, but not limited to: a project proposal, a preliminary report, weekly progress logs, a final report and a presentation.
- The coursework element(s) may consist of multiple items, online quizzes, one or more writing assignments and/or one or more programming assignments. The written examination is unseen and is two hours in length.
- The course catalogue defines explicitly the methods of assessment for each course.
- All courses carry the same weight (100 marks) except the graduation project courses which carry 200 marks (i.e. the graduation project is equivalent to two courses).

- Student assessment methods

Methods	Assessment
Pop Quiz (Formative assessment)	Give the students a quiz at the beginning, middle, or end of a lesson that involves just 5 to 10 questions, to assess the knowledge and understanding achieved by the student during lecture
Think-Pair-Share (Formative assessment)	Students spend one minute individually writing down key points from what they learned. They then pair up with a partner and compare notes, to assess the knowledge & understanding and general skills achieved by student during lecture.
Participation	To assess the knowledge and understanding achieved by the student during the previous weeks.
Electronic Midterm Exam	To assess the knowledge and understanding achieved by the student during the previous weeks. (Online on e-learning hub)
Pencil-to-Paper Final Exam	To evaluate what the student gain at the end of the course, and to assess: the knowledge and understanding, general skills, and intellectual skills.
Course Project	To allow students work in team, and to evaluate knowledge, understanding, intellectual, and transferable skills. (Online on e-learning hub, FTF)
Electronic Course Work & Quizzes	To keep the student always in the course, and to evaluate knowledge, understanding, intellectual, and transferable skills. (Online on e-learning hub)
Homework	To test and help student training on exams, to evaluate knowledge understanding, and intellectual skills.

Practical Exam	To measure the ability of students to design and implement a software program (FTF).
Project	The project assessment and the feedback received by the student, is designed to encourage consistent, well-structured activity and progress throughout the project.

- Course Work &Quizzes:
  - Short Exams, Assignments, Researches, Reports, Presentations on e-learning hub
  - Class/Project discussion in virtual classroom
  - Pop quiz
  - think-pair share.

- Weighting of assessments
According to regulations and requirements of the ministry of higher education, Courses fall into three categories:

Category # 1: Courses with lab. Components

Weighting of assessments

Mid-term exam & Semester work	10 %
Final-term written exam	70 %
Practical exam	20 %
Total	100 %

- Semester Work includes:
  - Short Exams, Assignments, Research, Reports, Presentations on e-learning hub
  - Class/Project discussion in virtual classroom
  - Pop quiz
  - think-pair share

Category # 2: Courses with no lab. Components

Weighting of assessments

Mid-term examination & Semester work	20 %
Final term written exam	80 %
Total	100 %

Category # 3: Graduation Project

Weighting of assessments

Mid-term examination & The first Semester work	20 %
Final presentation, documentation & Oral exam	80 %
Total	100 %

B. PROFESSIONAL INFORMATION

10- Characteristics of computer science graduates

Appendix (3) illustrates the characteristics of computer science graduates

B. PROFESSIONAL INFORMATION

11- Computer Science Jobs

The work of the graduates from the computer science program falls into four categories in compliance with ACM/IEE Computing Curricula:
Designing and implementing software; devising new ways to use computers; developing effective ways to solve computing problems; and planning and managing organizational technology infrastructure.

Appendix (4) illustrates the categories of jobs for computer science graduates

C. APPENDICES

Appendix (1): Program Matrices

A1.1 Map of Program aims against Program ILOs

Program aims	Intended learning outcomes (ILOs)			
	Knowledge and understanding	Intellectual skills	Professional and practical skills	General and transferable skills
1. Developing, in a flexible and progressive structure, students' knowledge and understanding of fundamental areas of computer science such as: algorithms, design and analysis, computational theory, computer architecture and software-based systems, with the ability to use this knowledge to devise, specify, design, implement, test, document and critically evaluate computer-based systems	A8, A9, A10, A11, A13, A14	B8, B9, B12, B15, B16, B18	C6, C9, C14, C18	D5, D11, D12
2. Providing students with a sound understanding and how to apply mathematics, science to real world problems; as well as to analyze and interpret data	A1, A4, A5	B1, B2, B3, B4	C9, C18	D11
3. Providing students with the analytic skills necessary to effectively evaluate the relative merits of software and computer systems, and algorithmic approaches.	A18, A20	B7, B8, B12, B16, B18	C6, C9, C18	D11
4. Providing students with a sound understanding and how to apply a wide range of principles and tools of software engineering, such as design methodologies, choice of algorithm, language, software libraries and user interface technique.	A2, A9, A17	B2, B3, B6	C1, C2, C3, C8, C10	D5, D12

Program aims	Intended learning outcomes (ILOs)			
	Knowledge and understanding	Intellectual skills	Professional and practical skills	General and transferable skills
5. Providing students with state-of-the-art knowledge and understanding of algorithms and data structures, computer organization and architecture, programming language concepts, networks, artificial intelligence, graphics, natural language processing, data mining, human computer interfaces, and databases, and identify and define the computing requirements for its solution.	A3, A6, A7, A8, A9, A12, A19, A21, A22	B1, B4	C11, C14	D5, D11
6. Giving students the opportunity to deepen their technical expertise in Designing, implementing, and evaluating a computer-based systems, process, component or program.		B8, B10, b13, B14, B17	C1, C2, C3, C5, C8, C10, C16,	D5
7. Developing the students' ability to use knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.		B8, B10, B13, B14, B17	C1, C2, C3, C5, C8	D5
8. Preparing students for working effectively in teams in designing and implementing software systems and to equip them with management skills to be able to carry out a work plan with minimal supervision	A15	B19	C5, C11	D2, D3, D4, D5, D6, D7, D11
9. Developing the students understanding of the key ethical, moral, legal issues affecting computer science and their responsibilities as computer science professionals.	A15, A16	B19	C11	D2, D3, D6,
10. Developing the students' ability to communicate, present and document ideas and concepts clearly and in an organized manner.		B5	C13, C15, C19	D1, D10, D11, D12

Program aims	Intended learning outcomes (ILOs)			
	Knowledge and understanding	Intellectual skills	Professional and practical skills	General and transferable skills
11. Equipping the students with independent learning skills and encourage an appreciation of the importance to computer science professionals of continuing professional development and lifelong learning		B11	C4, C7, C12, C17	D5, D8, D9

C. APPENDICES

Appendix (1): Program Matrices

Appendix A1.2: Matching the academic reference standards to the program's ILOs

A1.2.1 Knowledge and Understanding

National Academic Reference Standards	program ILOs
General ILOs (For Computing and Information programs): Knowledge and understanding of:	
1. (K1) Essential facts, concepts, principles and theories relating to computing and information and computer applications as appropriate to the program of study	A7, A8, A9, A13, A14
2. (K2) Modelling and design of computer-based systems bearing in mind the trade-offs	A21
3. (K3)Tools, practices and methodologies used in the specification, design, implementation and evaluation of computer software systems	A17
4. (K4) Criteria and specifications appropriate to specific problems, and plan strategies for their solution	A22
5. (K5)The extent to which a computer-based system meets the criteria defined for its current use and future development	A18
6.(K6) The current and underlying technologies that support computer processing and inter-computer communication	A19
7. (K7) Principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results	A20
8. (K8) Management and economics principles relevant to computing and information disciplines	A15
9. (K9) 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	A16
10. (K10) Current developments in computing and information research	A6
11. (K11) Requirements, practical constraints and computer-based systems	A3
Specific ILOs (For Computer Science programs)	
1. (A1) Understand the essential mathematics relevant to computer science.	A1
2. (A2) Use high-level programming languages	A2
3. (A3) Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics	A4
4. (A4) Interpret and analyzing data qualitatively and/or quantitatively	A5

National Academic Reference Standards	program ILOs
5. (A5) Know and understand the principles and techniques of a number of application areas informed by the research directions of the subject, such as artificial intelligence, natural language processing, data mining, databases and computer graphics.	A6
6.(A6) Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition	A7
7. (A7)Understand the fundamental topics in Computer Science, including hardware and software architectures, software engineering principles and methodologies, operating systems, compilers, parallel and distributed computing, systems and software tools.	A8, A9
8. (A8)Select advanced topics to provide a deeper understanding of some aspects of the subject, such as hardware systems design, object-oriented analysis and design, and artificial intelligence, and parallel and concurrent computing	A10, A11, A12

A1.2.2 Intellectual Skills

National Academic Reference Standards	Program ILOs
General ILOs (For Computing and Information programs):	
1. (I1) Analyze computing problems and provide solutions related to the design and construction of computing systems	B14
2. (I2) Realize the concepts, principles, theories and practices behind computing and information as an academic discipline	B15
3. (I3) Identify criteria to measure and interpret the appropriateness of a computer system for its current deployment and future evolution	B16
4.(I4) Analyze, propose and evaluate alternative computer systems and processes taking into account limitations, and quality constraints	B13
5. (I5) Make ideas, proposals and designs using rational and reasoned arguments for presentation of computing systems	B17
6. (I6) Evaluate the results of tests to investigate the functionality of computer systems	B18
7. (I7) Achieve judgments considering balanced costs, benefits, safety, quality, reliability, and environmental impact	B12
8. (I8) Familiar with the professional, legal, moral and ethical issues relevant to the computing industry	B19
9. (I9) Evaluate research papers in a range of knowledge areas	B11
Specific ILOs (For Computer Science programs)	
1. (B1) Define traditional and non-traditional problems, set goals towards solving them, and. observe results	B1
2. (B2) Perform comparisons between (algorithms, methods, techniques...etc)	B2
3. (B3) Perform classifications of (data, results, methods, techniques, algorithms..etc.)	B3
4. (B4) Identify attributes, components, relationships, patterns, main ideas, and errors	B4
5. (B5) Summarize the proposed solutions and their results	B5
6. (B6) Restrict solution methodologies upon their results	B6
7. (B7) Establish criteria, and verify solutions	B7
8. (B8) Identify a range of solutions and critically evaluate and justify proposed design solutions	B8
9. (B9) Solve computer science problems with pressing commercial or industrial constraints	B9
10. (B10) Generate an innovative design to solve a problem containing a range of commercial and industrial constraints	B10

A1.2.3 Professional and Practical Skills

National Academic Reference Standards	The program ILOs
General ILOs (For Computing and Information programs):	
1.(P1) Operate computing equipment, recognizing its logical and physical properties, capabilities, and limitations	C11, C14
2. (P2) Implement comprehensive computing knowledge and skills in projects and in deployment of computers to solve position practical problems	C5, C16
3. (P3) Deploy the equipment and tools used for the construction, maintenance and documentation of computer applications	C10
4. (P4) Apply computing information retrieval skills in computing community environment and industry	C7
5. (P5) Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material	C17
6. (P6) Design, implement, maintain, and manage software systems.	C5
7. (P7) Assess the implications, risks or safety aspects involved in the operation of computing equipment within a specific context	C9
8. (P8) Handle a mass of diverse data, assess risk and draw conclusions	C18
Specific ILOs (For Computer Science programs)	
1. (C1) Use appropriate programming languages, web-based systems and tools, design methodologies, and knowledge and database systems	C1, C2, C3
2. (C2) Communicate effectively by oral, written and visual means	C13
3. (C3) Perform independent information acquisition and management, using the scientific literature and Web sources	C4, C12
4. (C4) Prepare and present seminars to a professional standard	C19
5.(C5) Perform independent information acquisition and management, using the scientific literature and Web sources (redundant with 3)	C4, C12
6. (C6) Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy	C15
7. (C7) Specify, design, and implement computer-based systems	C5
8. (C8) Evaluate systems in terms of general quality attributes and possible trade-offs presented within the given problem	C6
9. (C9) Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video	C7
10. (C10) Apply the principles of human-computer interaction to the evaluation and construction of a wide range of materials including user interfaces, web pages, and multimedia systems	C8
11.(C11) Identify any risks or safety aspects that may be involved in the operation of computing equipment within a given context	C9
12. (C12) Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems	C10
13.(C13) Prepare technical reports, and a dissertation, to a professional standard (redundant with 6)	C19

A1.2.4 General and transferable skills

National Academic Reference Standards	The program ILOs
General ILOs (For Computing and Information programs):	
1. (T1) Demonstrate the ability to make use of a range of learning resources and to manage one's own learning	D9
2. (T2) Demonstrate skills in group working, team management, time management and organizational skills	D7, D2, D3, D4, D6
3. (T3) Show the use of information-retrieval	D5, D8
4. (T4) 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	D12
5. (T5) Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension	D11
6. (T6) Reveal communication skills, public speaking and presentation skills, and delegation, writing skills, oral delivery, and effectively using various media for a variety of audiences	D1, D10
7. (T7) Show the use of general computing facilities	D5
8. (T8) Demonstrate an appreciation of the need to continue professional development in recognition of the requirement for life-long learning	D8, D9

A1.2.5 Program ILOs- NARS Matrix

Knowledge and Understanding

Program ILOS – NARS	K1. Concepts relating to computing and information	K2. Modeling and design of computer-based systems	K3. Tools, practices and methodologies	K4. Criteria and specifications appropriate to specific problems	K5. criteria defined for its current use and future development	K6. technologies that support computer processing	K7. generating tests	K8. Management and economics principles	K9. moral and ethical issues	K10. Current developments	K11. Requirements, practical constraints and computer-based systems		A1. essential mathematics relevant to computer science	A2. Use high-level programming languages	A3. core of analysis, algebra, applied mathematics and statistics	A4. analyzing data qualitatively	A5. a number of application areas i	A6. principles of artificial intelligence, image, and pattern recognition	A7. fundamental topics in Computer Science	A8. advanced topics
A1. Understand the essential mathematics relevant to computer science. [NARS CS A1]													√							
A2. Use high-level programming languages. [NARS CS A2]														√						
A3. Show a critical understanding of Requirements, practical constraints and computer-based systems [NARS GENERAL11]											√									
A4. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics. [NARS CS A3]															√					
A5. Interpreting and analyzing data qualitatively and/or quantitatively. [NARS CS A4]																√				
A6. Know and understand the principles and techniques of a number of application areas informed by the research directions of computer science. [NARS GENERAL K10]										√							√			
A7. Show a critical understanding of the principles of artificial intelligence, image, and	√																	√		

Program ILOS – NARS	K1. Concepts relating to computing and information	K2. Modeling and design of computer-based systems	K3. Tools, practices and methodologies	K4. Criteria and specifications appropriate to specific problems	K5. criteria defined for its current use and future development	K6. technologies that support computer processing	K7. generating tests	K8. Management and economics principles	K9. moral and ethical issues	K10. Current developments	K11. Requirements, practical constraints and computer-based systems		A1. essential mathematics relevant to computer science	A2. Use high-level programming languages	A3. core of analysis, algebra, applied mathematics and statistics	A4. analyzing data qualitatively	A5. a number of application areas i	A6. principles of artificial intelligence, image, and pattern recognition	A7. fundamental topics in Computer Science	A8. advanced topics
pattern recognition. [NARS CS A6]																				
A8. Understand fundamental topics in computer systems, including hardware architectures and operating systems. [NARS CS A7]	√																		√	
A9. Understand fundamental topics in computer science, including software architectures, software engineering principles and methodologies, and software tools. [NARS CS A7]	√																		√	
A10. Select advanced topics to provide a deeper understanding of some aspects of the hardware systems design, operating systems, computer security and compiler theory. [NARS CS A8]																				√
A11. Select advanced topics to provide a deeper understanding of some aspects of object-oriented analysis and design, and software engineering.																				√
A12. Select advanced topics to provide a deeper understanding of some aspects of the artificial intelligence, image processing, and computer graphics and animation. . [NARS CS A8]																				√
A13. Demonstrate strong knowledge of	√																			

Program ILOS – NARS	K1. Concepts relating to computing and information	K2. Modeling and design of computer-based systems	K3. Tools, practices and methodologies	K4. Criteria and specifications appropriate to specific problems	K5. criteria defined for its current use and future development	K6. technologies that support computer processing	K7. generating tests	K8. Management and economics principles	K9. moral and ethical issues	K10. Current developments	K11. Requirements, practical constraints and computer-based systems		A1. essential mathematics relevant to computer science	A2. Use high-level programming languages	A3. core of analysis, algebra, applied mathematics and statistics	A4. analyzing data qualitatively	A5. a number of application areas i	A6. principles of artificial intelligence, image, and pattern recognition	A7. fundamental topics in Computer Science	A8. advanced topics
fundamentals of programming and the construction of computer-based systems. [NARS GENERAL K1]																				
A14. Demonstrate strong knowledge of fundamentals of data structures and algorithms. [NARS GENERAL K1]	√																			
A15. Show a critical understanding of the broad context within computing including issues such as quality, reliability, enterprise, employment law, and management, economics and accounting principles. [NARS GENERAL K8]								√												
A16. Provide a deeper understanding of legal, professional, ethical issues and moral aspects of the exploitation of computing. [NARS GENERAL K9]									√											
A17. Determine the tools, practices and methodologies used in the specification. [NARS GENERAL K3]			√																	
A18. identify the methods used in defining and assessing criteria for measuring the extent to which a computer system is appropriate for its current deployment and future evolution. [NARS GENERAL K5]					√															

Program ILOS – NARS	K1. Concepts relating to computing and information	K2. Modeling and design of computer-based systems	K3. Tools, practices and methodologies	K4. Criteria and specifications appropriate to specific problems	K5. criteria defined for its current use and future development	K6. technologies that support computer processing	K7. generating tests	K8. Management and economics principles	K9. moral and ethical issues	K10. Current developments	K11. Requirements, practical constraints and computer-based systems		A1. essential mathematics relevant to computer science	A2. Use high-level programming languages	A3. core of analysis, algebra, applied mathematics and statistics	A4. analyzing data qualitatively	A5. a number of application areas i	A6. principles of artificial intelligence, image, and pattern recognition	A7. fundamental topics in Computer Science	A8. advanced topics
A19. Recognize the current and underlying technologies that support computer processing and inter-computer communication. [NARS GENERAL K6]						√														
A20. Describe of the principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results. [NARS GENERAL K7]							√													
A21. Identify Modelling and design techniques of computer-based systems bearing in mind the trade-offs. [NARS GENERAL K2]		√																		
A22. Define the criteria and specifications appropriate to specific problems, and plan strategies for their solution [NARS GENERAL K4]				√																

Intellectual

Program ILOS – NARS	I1. Analyze computing problems and provide solutions	I2. concepts, theories behind computing and information	I3. criteria to measure and interpret the appropriateness	I4. evaluate alternative computer systems	I5. ideas, proposals and designs	I6. Evaluate the results of tests	I7. judgments considering costs, benefits, safety, quality, reliability	I8. Familiar with the professional, legal, moral and ethical issues	I9. Evaluate research papers		B1 Define traditional and non-traditional problems	B2. Perform comparisons	B3. Perform classifications	B4. Identify attributes, components, relationships, patterns	B5. Summarize the proposed solutions	B6. Restrict solution methodologies	B7 Establish criteria, and verify solutions	B8 critically evaluate and justify proposed design	B9. Solve computer science problems	B10. Generate an innovative design
B1. Define traditional and non-traditional problems, set goals towards solving them, and observe results. [NARS CS B1]											√									
B2. Perform comparisons between (algorithms, methods, techniques, etc.). [NARS CS B2]												√								
B3. Perform classifications of (data, results, methods, techniques, algorithms, etc.). [NARS CS B3]													√							
B4. Identify attributes, components, relationships, patterns, main ideas, and errors. [NARS CS B4]														√						
B5. Summarize the proposed solutions and their results. [NARS CS B5]															√					
B6. Restrict solution methodologies upon their results[NARS CS B6]																√				
B7. Establish criteria, and verify solutions. [NARS CS B7]																	√			
B8. Identify a range of solutions and critically evaluate and justify proposed design solutions. [NARS CS B8]																		√		

Program ILOS – NARS	I1. Analyze computing problems and provide solutions	I2. concepts, theories behind computing and information	I3. criteria to measure and interpret the appropriateness	I4. evaluate alternative computer systems	I5. ideas, proposals and designs	I6. Evaluate the results of tests	I7. judgments considering costs, benefits, safety, quality, reliability	I8. Familiar with the professional, legal, moral and ethical issues	I9. Evaluate research papers		B1 Define traditional and non-traditional problems	B2. Perform comparisons	B3. Perform classifications	B4. Identify attributes, components, relationships, patterns	B5. Summarize the proposed solutions	B6. Restrict solution methodologies	B7 Establish criteria, and verify solutions	B8 critically evaluate and justify proposed design	B9. Solve computer science problems	B10. Generate an innovative design
B9. Solve computer science problems with pressing commercial or industrial constraints[NARS CS B9]																			√	
B10. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints. [NARS CS B10]																				√
B11. Use investigative skills to research new and novel aspects of their work [NARS GENERAL I9]									√											
B12. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application). [NARS GENERAL I7]							√													
B13. Analyze and evaluate a range of options in producing a solution to an identified problem. [NARS GENERAL I4]				√																
B14. Perform problem analysis from written descriptions; derive requirements specifications from an understanding of problems (analysis, synthesis). [NARS GENERAL I1]	√																			
B15. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline. [NARS GENERAL I2]		√																		
B16. Define and assess criteria to measure			√																	

Program ILOS – NARS	I1. Analyze computing problems and provide solutions	I2. concepts, theories behind computing and information	I3. criteria to measure and interpret the appropriateness	I4. evaluate alternative computer systems	I5. ideas, proposals and designs	I6. Evaluate the results of tests	I7. judgments considering costs, benefits, safety, quality, reliability	I8. Familiar with the professional, legal, moral and ethical issues	I9. Evaluate research papers		B1 Define traditional and non-traditional problems	B2. Perform comparisons	B3. Perform classifications	B4. Identify attributes, components, relationships, patterns	B5. Summarize the proposed solutions	B6. Restrict solution methodologies	B7 Establish criteria, and verify solutions	B8 critically evaluate and justify proposed design	B9. Solve computer science problems	B10. Generate an innovative design
the appropriateness of a computer system for its current deployment and future evolution, and to interpret the results thereof. [NARS GENERAL I3]																				
B17. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences. [NARS GENRAL I5]					√															
B18. Evaluate the results of tests to investigate the functionality of computer systems. [NARS GENERAL I6]						√														
B19. Address and apply professional, moral and ethical issues within the discipline. [NARS GENERAL I8]								√												

Professional

Program ILOS – NARS	P1. Operate computing equipment	P2. Implement computing knowledge and skills in projects	P3. Deploy the equipment and tools used for the construction	P4. Apply computing information retrieval skills	P5. Develop a range of fundamental research skills	P6. Design, implement, maintain, and manage software systems	P7. Assess the implications, risks	P8. Handle a mass of diverse data		C1 Use appropriate programming languages	C2. Communicate effectively	C3. Perform independent information acquisition	C4. Prepare and present seminars	C5. Perform independent information	C6. Prepare technical reports	C7. Specify, design, and implement computer-based systems	C8. Evaluate systems in terms of general quality	C9. effective information management	C10. human-computer interaction	C11. risks involved in the operation of computing equipment	C12.. tools for building &docs	C13. technical reports
C1. Use appropriate programming languages and design methodologies. [NARS CS C1]										√												
C2. Use appropriate web-based systems, tools and design methodologies. [NARS CS C1]										√												
C3. Use appropriate database systems. [NARS CS C1]										√												
C4. Perform independent information acquisition and management, using the scientific literature and Web sources. [NARS CS C3]												√		√								
C5. Specify, design, and implement and manage computer-based systems. [NARS CS C7]		√				√										√						
C6. Evaluate systems in terms of general quality attributes and possible trade-offs presented within the given problem. [NARS CS C8]																	√					
C7. Apply the principles of effective information management, information organization, and information-retrieval skills				√														√				

Program ILOS – NARS	P1. Operate computing equipment	P2. Implement computing knowledge and skills in projects	P3. Deploy the equipment and tools used for the construction	P4. Apply computing information retrieval skills	P5. Develop a range of fundamental research skills	P6. Design, implement, maintain, and manage software systems	P7. Assess the implications, risks	P8. Handle a mass of diverse data		C1 Use appropriate programming languages	C2. Communicate effectively	C3. Perform independent information acquisition	C4. Prepare and present seminars	C5. Perform independent information	C6. Prepare technical reports	C7. Specify, design, and implement computer-based systems	C8. Evaluate systems in terms of general quality	C9. effective information management	C10. human-computer interaction	C11. risks involved in the operation of computing equipment	C12.. tools for building &docs	C13. technical reports
to information of various kinds, including text, images, sound, and video. [NARS CS C9]																						
C8. Apply the principles of human-computer interaction to the evaluation and construction of a wide range of materials including user interfaces, web pages, and multimedia systems. [NARS CS C10]																			√			
C9. Identify any risks or safety aspects that may be involved in the operation of computing equipment within a given context. [NARS CS C11]							√													√		
C10. Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems. [NARS CS C12]			√																		√	
C11. Make effective use of general computing facilities, plan and manage a project to complete within budget and schedule. [NARS GENERAL P1]	√																					
C12. Appreciate and manage the need for continuing professional development in recognition of the need for lifelong learning.												√		√								

Program ILOS – NARS	P1. Operate computing equipment	P2. Implement computing knowledge and skills in projects	P3. Deploy the equipment and tools used for the construction	P4. Apply computing information retrieval skills	P5. Develop a range of fundamental research skills	P6. Design, implement, maintain, and manage software systems	P7. Assess the implications, risks	P8. Handle a mass of diverse data		C1 Use appropriate programming languages	C2. Communicate effectively	C3. Perform independent information acquisition	C4. Prepare and present seminars	C5. Perform independent information	C6. Prepare technical reports	C7. Specify, design, and implement computer-based systems	C8. Evaluate systems in terms of general quality	C9. effective information management	C10. human-computer interaction	C11. risks involved in the operation of computing equipment	C12.. tools for building &docs	C13. technical reports
[NARS CS C3]																						
C13. Communicate effectively by oral, written and visual means [NARS CS C2]											√											
C14. Operate computing equipment efficiently, taking into account its logical and physical properties. [NARS GENERAL P1]	√																					
C15. Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy [NARS CS C6]															√							√
C16. Apply tools and techniques for the design and development of applications. [NARS GENERAL P2]		√																				
C17. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material [NARS GENERAL P5]					√																	
C18. Handle a mass of diverse data, assess risk and draw conclusions [NARS GENERAL P8]								√														
C19. Prepare and present seminars to a professional standard [NARS CS C4]													√									

General

Program ILOS - NARS	T1. learning resources and to manage one's own learning	T2. group working, team management, time	T3. use of information-retrieval	T4. mix of tools and aids in preparing and presenting reports	T5. numeracy skills	T6. communication skills	T7. use of general computing facilities	T8. life-long learning
D1. Communicate effectively by oral, written and visual means. [NARS GENERAL T6]						√		
D2. Work effectively as an individual and as a member of a team. [NARS GENERAL T2]		√						
D3. Collaborate effectively within multidisciplinary team. [NARS GENERAL T2]		√						
D4. Work in stressful environment and within constraints. [NARS GENERAL T2]		√						
D5. Demonstrate efficient IT capabilities. [NARS GENERAL T7]			√				√	
D6. Lead and motivate individuals. [NARS GENERAL T2]		√						
D7. Manage tasks and resources. [NARS GENERAL T2]		√						
D8. Search for information and adopt life-long self-learning. [NARS GENERAL T3]			√					√
D9. Manage one's own learning and development. [NARS GENERAL T1]	√							√
D10. Communicate effectively with team members, managers and costumers. [NARS GENERAL T6]						√		
D11. Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension. [NARS GENERAL T5]					√			
D12. 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 [NARS GENERAL T4]				√				

Note: **The entire NARS-Program ILOs Matrix is also provided in an attached separate Excel file**

. APPENDICES

Appendix (1): Program Matrices

Appendix A1.3: Program ILOs VS Graduate attributes

Program ILOs VS Graduate attributes

Graduate Attributes

General Attributes
GA1: Apply the fundamental theories and principles of computing and information applications
GA2: Integrate and evaluate the computing tools and facilities
GA3: Apply knowledge of mathematics and science
GA4: Design a computing system, component and process to meet the required needs within realistic constraints.
GA5: Exploit the techniques, skills and up-to-date computing tools, necessary for computing and information practice
GA6: Display professional responsibilities and ethical, societal and cultural concerns
GA7: Use, compare and evaluate a range of formal and informal techniques, theories and methods to develop computing and information applications
GA8: Consider and deal with the individual, social, environmental, organizational and economic implications of the application of computing and information
GA9: Carry out a work plan with minimal supervision
GA10: Communicate effectively
GA11: Hold knowledge and skills required by the computing and information industry
GA12: Engage in self and life-long learning and research in computing and information
GA13: Fulfill requirements of potential employers
GA14: Demonstrate knowledge and competence in fundamental areas of computer science such as: algorithms, design and analysis, computational theory, computer architecture and software based systems
GA15: Apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and design, implementation, evaluation and evolution of computer-based systems
GA16: Apply knowledge of mathematics and science to real world problems; as well as to analyze and interpret data
GA17: Demonstrate the analytic skills necessary to effectively evaluate the relative merits of software and computer systems, and algorithmic approaches
GA18: Understand and apply a wide range of principles and tools of software engineering, such as design methodologies, choice of algorithm, language, software libraries and user interface technique.

GA19: Understand and apply a wide range of principles and tools of natural language processing and data mining
GA20: Have a solid understanding of the used concepts in computer science to be able to pursue further learning, whether as graduate students or on their own
GA21: Demonstrate an understanding of algorithms and data structures, computer organization and architecture, programming language concepts, compilers, networks, artificial intelligence, graphics, human computer interfaces, and databases, and identify and define the computing requirements for its solution
GA22: Design, implement, and evaluate a computer-based systems, process, component or program
GA23: Use knowledge and understanding in the modelling and design of computer-based systems in a way that demonstrates comprehension of the trade-off involved in design choices

Knowledge and Understanding

	General Graduate Attributes										Computer Science Graduate Attributes												
Program ILOs – NARS Graduate Attributes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
A1. Understand the essential mathematics relevant to computer science. [NARS CS A1]															√	√							
A2. Use high-level programming languages. [NARS CS A2] A14	√		√																				
A3. Show a critical understanding of Requirements, practical constraints and computer-based systems [NARS GENERAL11]			√																				
A4. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics. [NARS CS A3]	√		√												√	√							
A5. Interpreting and analyzing data qualitatively and/or quantitatively. [NARS CS A4]	√	√	√																				
A6. Know and understand the principles and techniques of a number of application areas informed by the research directions of computer science. [NARS GENERAL K10]		√	√		√		√				√		√										
A7. Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition. [NARS CS A6]																		√	√		√		
A8. Understand fundamental topics in computer systems, including hardware architectures and operating systems. [NARS CS A7]														√							√		
A9. Understand fundamental topics in computer science, including software architectures, software engineering principles and methodologies, and software tools. [NARS CS A7]														√							√		

	General Graduate Attributes										Computer Science Graduate Attributes												
Program ILOs – NARS Graduate Attributes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
A10. Select advanced topics to provide a deeper understanding of some aspects of the hardware systems design, operating systems, computer security and compiler theory. [NARS CS A8]																			√	√	√		
A11. Select advanced topics to provide a deeper understanding of some aspects of object-oriented analysis and design, and software engineering. [NARS CS A8]																			√	√	√		
A12. Select advanced topics to provide a deeper understanding of some aspects of the artificial intelligence, image processing, and computer graphics and animation. . [NARS CS A8]																			√	√	√		
A13. Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems. [NARS GENERAL K1]	√			√										√						√			
A14. Demonstrate strong knowledge of fundamentals of data structures and algorithms. [NARS GENERAL K1]																			√	√	√		
A15. Show a critical understanding of the broad context within computing including issues such as quality, reliability, enterprise, employment law, and management, economics and accounting principles. [NARS GENERAL K8]					√			√			√												
A16. Provide a deeper understanding of legal, professional, ethical issues and moral aspects of the exploitation of computing. [NARS GENERAL K9]			√										√										
A17. Determine the tools, practices and methodologies used in the specification. [NARS GENERAL K3]							√		√		√		√										
A18. identify the methods used in defining and assessing criteria formeasuring the extent to which a computer system is appropriate for its current deployment and future evolution. [NARS GENERAL K5]											√		√										
A19. Recognize the current and underlying technologies that support computer processing and inter-computer communication. [NARS GENERAL K6]		√				√		√	√		√		√										
A20. Describe of the principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results. [NARS GENERAL K7]					√	√					√	√	√										
A21. Identify Modelling and design techniques of computer-based systems bearing in mind the trade-offs. [NARS GENERAL K2]		√		√	√		√						√									√	

	General Graduate Attributes										Computer Science Graduate Attributes												
Program ILOs – NARS Graduate Attributes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
A22. Define the criteria and specifications appropriate to specific problems, and plan strategies for their solution [NARS GENERAL K4]			√		√		√				√	√	√										

Intellectual

Program ILOs – NARS Graduate Attributes	General Graduate Attributes										Computer Science Graduate Attributes												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
B1. Define traditional and non-traditional problems, set goals towards solving them, and observe results. [NARS CS B1]							√																
B2. Perform comparisons between (algorithms, methods, techniques, etc.). [NARS CS B2]						√		√															
B3. Perform classifications of (data, results, methods, techniques, algorithms, etc.). [NARS CS B3]				√							√		√										
B4. Identify attributes, components, relationships, patterns, main ideas, and errors. [NARS CS B4]							√			√													
B5. Summarize the proposed solutions and their results. [NARS CS B5]				√													√						
B6. Restrict solution methodologies upon their results[NARS CS B6]							√																
B7. Establish criteria, and verify solutions. [NARS CS B7]								√			√												
B8. Identify a range of solutions and critically evaluate and justify proposed design solutions. [NARS CS B8]	√			√	√		√	√				√					√						
B9. Solve computer science problems with pressing commercial or industrial constraints[NARS CS B9]							√								√								√
B10. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints. [NARS CS B10]																		√					
B11. Use investigative skills to research new and novel aspects of their work [NARS GENERAL I9]				√			√	√			√		√										
B12. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application). [NARS GENERAL I7]				√		√		√															
B13. Analyze and evaluate a range of options in producing a solution to an identified problem. [NARS GENERAL I4]				√	√																		
B14. Perform problem analysis from written descriptions; derive requirements specifications from an understanding of problems (analysis, synthesis). [NARS GENERAL I1]	√	√		√	√						√					√						
B15. Apply the concepts, principles, theories and practices											√		√										

	General Graduate Attributes										Computer Science Graduate Attributes												
Program ILOs – NARS Graduate Attributes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
underpinning computing as an academic discipline. [NARS GENERAL I2]																							
B16. 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 GENERAL I3]				√																			
B17. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences. [NARS GENRAL I5]		√																					
B18. Evaluate the results of tests to investigate the functionality of computer systems. [NARS GENERAL I6]				√	√	√	√	√			√												
B19. Address and apply professional, moral and ethical issues within the discipline. [NARS GENERAL I8]		√			√		√					√											

Professional

	General Graduate Attributes										Computer Science Graduate Attributes												
Program ILOs – NARS Graduate Attributes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C1. Use appropriate programming languages and design methodologies. [NARS CS C1]		√		√	√		√						√										
C2. Use appropriate web-based systems, tools and design methodologies. [NARS CS C1]		√		√	√		√						√										
C3. Use appropriate database systems. [NARS CS C1]		√		√	√		√						√										
C4. Perform independent information acquisition and management, using the scientific literature and Web sources. [NARS CS C3]	√				√		√				√	√	√										
C5. Specify, design, and implement and manage computer-based systems. [NARS CS C7]				√	√					√													
C6. Evaluate systems in terms of general quality attributes and possible trade-offs presented within the given problem. [NARS CS C8]											√		√							√			
C7. Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video. [NARS CS C9]		√		√		√					√		√						√				
C8. Apply the principles of human-computer interaction to the evaluation and construction of a wide range of materials including user interfaces, web pages, and multimedia systems. [NARS CS C10]																	√	√					
C9. Identify any risks or safety aspects that may be involved in the operation of computing equipment within a given context. [NARS CS C11]										√													
C10. Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems. [NARS CS C12]					√													√				√	
C11. Make effective use of general computing facilities, plan and manage a project to complete within budget and schedule. [NARS GENERAL P1]					√						√		√										

	General Graduate Attributes										Computer Science Graduate Attributes												
Program ILOs – NARS Graduate Attributes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C12. Appreciate and manage the need for continuing professional development in recognition of the need for lifelong learning. [NARS CS C3]	√				√		√				√	√	√										
C13. Communicate effectively by oral, written and visual means [NARS CS C2]		√																					
C14. Operate computing equipment efficiently, taking into account its logical and physical properties. [NARS GENERAL P1]					√						√		√										
C15. Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy [NARS CS C6]	√	√		√	√		√	√			√		√										
C16. Apply tools and techniques for the design and development of applications. [NARS GENERAL P2]		√			√		√				√		√										
C17. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material [NARS GENERAL P5]				√																			
C18. Handle a mass of diverse data, assess risk and draw conclusions [NARS GENERAL P8]										√													
C19. Prepare and present seminars to a professional standard [NARS CS C4]	√																						

General

Program ILOs – NARS Graduate Attributes	General Graduate Attributes										Computer Science Graduate Attributes												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
D1. Communicate effectively by oral, written and visual means. [NARS GENERAL T6]										√			√										
D2. Work effectively as an individual and as a member of a team. [NARS GENERAL T2]								√	√	√			√										
D3. Collaborate effectively within multidisciplinary team. [NARS GENERAL T2]								√	√	√			√										
D4. Work in stressful environment and within constraints. [NARS GENERAL T2]								√	√	√			√										
D5. Demonstrate efficient IT capabilities. [NARS GENERAL T7]		√																					
D6. Lead and motivate individuals. [NARS GENERAL T2]								√	√	√			√										
D7. Manage tasks and resources. [NARS GENERAL T2]								√	√	√			√										
D8. Search for information and adopt life-long self-learning. [NARS GENERAL T3]		√										√											
D9. Manage one's own learning and development. [NARS GENERAL T1]												√										√	
D10. Communicate effectively with team members, managers and costumers. [NARS GENERAL T6]										√			√										
D11. Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension. [NARS GENERAL T5]										√													
D12. 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 [NARS GENERAL T4]										√													

C. APPENDICES

Appendix (1): Program Matrices

Appendix A1.4: program ILOs & Program Courses cross references

A1.4.1 Courses and their ILOs

A1.4.1.1 First Year-First Semester

Code No.	Course title	Program ILO covered			
		Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
1101	Introduction to computers & application	A8, A9, A13, A14	B4, B15	C4, C17	D5, D8
1102	Discrete structure	A1, A4	B1, B7, B8	C16	D11
1103	Physics	A4, A5	B1, b4, B7	C6	
1104	Mathematics (1)	A1, A4	B1, B7, B8	C16	
1105	English (1)	A16	B4, B14	C4, C12, C13, C15, C19	D1, D8, D9, D10

A1.4.1.2 First Year-Second Semester

Code No.	Course title	Program ILO Covered			
		Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
1201	Structured Programming	A2, A13	B6, B9, B10, B13	C1, C5	D5
1202	Computer Packages	A17	B1, B6, B14	C10, C15, C19	D5, D12
1203	Electronics	A8	B1, B4, B7, B8	C6, C9	D9
1204	Mathematics (2)	A1, A4	B1, B7, B8	C16	
1205	English (2)	A16	B4, B14	C4, C12, C13, C15, C19	D1, D8, D9, D10
1206	Operations Research	A4, A21	B1, B2, B4, B7, B8, B13	C6, C16	D11

A1.4.1.3 Second Year-First Semester

Code No.	Course title	Program ILO covered			
		Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
2101	Mathematics (3)	A1, A4	B1, B7, B8	C16	
2102	Data structures	A2, A13, A14, A21	B1, B2, B3	C1, C5, C6, C16	D5
2103	Object oriented programming	A2, A11, A13, a20	B3, B4	C1, C5, C10, C16	D5
2104	Logic design	A8	B2, B4, B7, B8	C5, C6, C9	D9
2105	Humanities Fundamentals of Management	A15, A16	B4, B11	C11, C12, C19	D1, D2, D3, D4, D6, D7, D10

A1.4.1.4 Second Year-Second Semester

Code No.	Course title	Program ILO covered			
		Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
2201	System analysis	A3, A11, A13, A15, A17, A21, A22	B1, B4, B6, B7, B14, B17	C5, C6, c9, C13, C15, C19	D1, D2, D5, D9, D10, D12
2202	File organization	A2, A13, A20	B2, B3, B4, B8,	C1, C5, C7, C9, C10, C18	D5
2203	Probability & statistics	A1, A4	B1, B5, B7, B8	C16	D11
2204	Computer organization	A8, A10, A15, A18, A19	B4, B7, B8, B16	C1, C5, C6, C14	D9
2205	Humanities Fundamentals of Accounting	A15, A16	B10	C11	
2206	Pattern recognition	A6, A7, A12, A14, A21	B2, B3, B4	C10, C16	D5, D11

A1.4.1.5 Third Year-First Semester

Code No.	Course title	Program ILO Covered			
		Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
3101	Data base systems	A5, A9, A20, A21, A22	B3, B4, B7, B8, B10, bB12	C1, C3, C5, C7, C10, C18, C19	D5, d12
3102	Operating system	A8, A10, A18, A19,	B2, B4, B16	C6, C9, C10, C11, C14	D5
3103	System design	A9, A11, A13, A15, A21	B2, B4, B5, B6, B8, B12, B17	C5, C6, C9, C13, C15, C19	D1, D2, D5, D9, D10, D12
3104	Human computer interfaces	A2, A13, A20, A21	B3, B4	C1, C5, C8, C10, C16	D5
3105	System level programming	A2, A13, A20	B3, B4	C1, C5, C10, C16	D5
3106	Computer modelling and simulation	A14, A21	B1, B2, B4, B7, B8, B13, B15	C6, C16	D11

A1.4.1.6 Third Year-Second Semester

Code No.	Course title	Program ILO Covered			
		Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
3201	Computer networks	A18, A19, A21	B1, B2, B4, B5, B13, B16	C6, C9, C10, C14	D5
3202	Computer graphics	A12, A21	B2, B3, B4	C1, C7, C10	D5
3203	Software engineering (1)	A3, A9, A11, A15, A16, A17, A18, A21, A22	B1, B2, B4, B5, B6, B7,B, B9, B11, B12, B14, B15, B18, B19	C2, C3, C4, C5, C6, C9, C10, c11, C13, C15, C17, C18, C19	D1, D2, D3, D6, D7, D8, D9, D10, D12
3204	Logic programming	A2, A13, A20	B3, B4, B18	C1, C5, C10, C16	D12, D5
3205	Analysis & design of algorithms	A4, A14, A21	B1, B2, B3, B4, B5, B6, B7, B17	C5, C6, C10, C16	D9
3206	Human rights	A16			

A1.4.1.7 Fourth Year-First Semester

Code No.	Course title	Program ILO Covered			
		Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
4101	Artificial intelligence	A7, A12, A21	B1, B2, B3, B4, B5, B10	C1, C5, C6, C10	D5
4102	Network programming	A2, A6, A13, A14, A20	B3, B4, B18	C1, C2, C5, C7, C8, C10, C16	D5
4103	Software engineering (2)	A9, A11, A15, A16, A18, A20, A21	B2, B4, B5, B6, B7, b8, B11, B12, B14, B15, B18, B19	C2, C3, C4, C5, C6, C9, C10, C11, C13, C15, C17, C18, C19	D1, D2, D3, D4, D6, D7, D8, D9, D10, D12
4104	Computer security	A10, A18, A19	B1, B2, B16	C6, C9	D5
4105	Computer vision	A6, A12, A21	B2	C5	D5
4106	Project	A3, A9, A11, A15, A16, A17, A18, A20, A21, A22	B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B14, B17, B18, B19	C1, C3, C4, C5, c6, C7, C8, C9, C10, C11, C12, C13, C15, C17, C19	D1, D2, D3, D4, D6, D7, D8, D9, D10

A1.4.1.8 Fourth Year-Second Semester

Code No.	Course title	Program ILO Covered			
		Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
4201	Expert systems	A7, A12, A21	B1, B3, B4, B5, B10	C1, C5, C6	D5, D11, D12
4202	Multimedia	A14, A21	B1, B3, B4, B8	C7, C8, C10	D5, D11, D12
4203	Compiler theory	A10	B1, B2, B4, B15	C10	D12
4204	VLSI	A8, A10, A19	B1, B2, B4, B8, B10	C1, C5, C6	D12
4106	Project	A3, A9, A11, A15, A16, A17, A18, A20, A21, A22	B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B14, B17, B18, B19	C1, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C15, C17, C19	D1, D2, D3, D4, D6, D7, D8, D9, D10

A1.4.2 Program ILOs versus Courses

A1.4.2.1 Knowledge and Understanding

Program ILO	**Courses**
A1. Understand the essential mathematics relevant to computer science	**1102 Discrete structure** **1104 Mathematics (1)** **1204 Mathematics (2)** **2101 Mathematics (3)** **2203 Probability & statistics**
A2. Use high-level programming languages	**1201 Structured Programming** **2102 Data structures** **2103 Object oriented programming** **2202 File organization** **3104 Human computer interfaces** **3105 System level programming** **3204 Logic programming** **4102 Network programming**
A3. Show a critical understanding of Requirements, practical constraints and computer-based systems	**2201 System analysis** **3203 Software engineering (1)** **4106 Project**
A4. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics	**1102 Discrete structure** **1103 Physics** **1104 Mathematics (1)** **1204 Mathematics (2)** **1206 Operations Research** **2101 Mathematics (3)** **2203 Probability & statistics** **3205 Analysis & design of algorithms**
A5. Interpreting and analyzing data qualitatively and/or quantitatively	**1103 Physics** **3101 Data base systems**
A6. Know and understand the principles and techniques of a number of application areas informed by the research directions of computer science.	**2206 Pattern recognition** **4102 Network programming** **4105 Computer vision**
A7. Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition	**2206 Pattern recognition** **4101 Artificial intelligence** **4201 Expert systems**
A8. Understanding of fundamental topics in computer systems, including hardware architectures and operating systems	**1101 Introduction to computers & application** **1203 Electronics** **2104 Logic design** **2204 Computer organization** **3102 Operating system** **4204 VLSI**
A9. Understanding of fundamental topics in computer science, including software architectures, software engineering principles and methodologies, and software tools	**1101 Introduction to computers & application** **3101 Data base systems** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
A10. Select advanced topics to provide a deeper understanding of some aspects of the hardware systems design, operating systems, computer security and compiler theory	**2204 Computer organization** **3102 Operating system** **4104 Computer security** **4203 Compiler theory**

Program ILO	Courses
	4204 VLSI
A11. Select advanced topics to provide a deeper understanding of some aspects of object-oriented analysis and design, and software engineering	**2103 Object oriented programming** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
A12. Select advanced topics to provide a deeper understanding of some aspects of the artificial intelligence, image processing, and computer graphics	**2206 Pattern recognition** **3202 Computer graphics** **4101 Artificial intelligence** **4105 Computer vision** **4201 Expert systems**
A13. Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems	**1101 Introduction to computers & application** **1201 Structured Programming** **2102 Data structures** **2103 Object oriented programming** **2202 File organization** **3104 Human computer interfaces** **3105 System level programming** **3204 Logic programming** **4102 Network programming** **2201 System analysis** **3103 System design**
A14. Demonstrate strong knowledge of fundamentals of data structures and algorithms	**1101 Introduction to computers & application** **2102 Data structures** **2206 Pattern recognition** **3106 Computer modelling and simulation** **3205 Analysis & design of algorithms** **4102 Network programming** **4202 Multimedia**
A15. Show a critical understanding of the broad context within computing including issues such as quality, reliability, enterprise, employment law and accounting	**2105 Fundamentals of Management** **2201 System analysis** **2204 Computer organization** **2205 Fundamentals of Accounting** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
A16. Provide a deeper understanding of legal, professional and moral aspects of the exploitation of computing.	**1106 English (1)** **1206 English (2)** **2105 Fundamentals of Management** **2205 Fundamentals of Accounting** **3203 Software engineering (1)** **3206 Human rights** **4103 Software engineering (2)** **4106 Project**
A17. Knowledge of the tools, practices and methodologies used in the specification	**1202 Computer Packages** **2201 System analysis** **3203 Software engineering (1)** **4106 Project**
A18. identify the methods used in defining and assessing criteria for measuring the extent to which a computer system is appropriate for its current deployment and	**2204 Computer organization** **3102 Operating system** **3201 Computer networks**

Program ILO	Courses
future evolution	**3203 Software engineering (1)** **4103 Software engineering (2)** **4104 Computer security** **4106 Project**
A19. Recognize the current and underlying technologies that support computer processing and inter-computer communication	**2204 Computer organization** **3102 Operating system** **3201 Computer networks** **4104 Computer security** **4204 VLSI**
A20. Describe the principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results	**2103 Object oriented programming** **2202 File organization** **3101 Data base systems** **3104 Human computer interfaces** **3105 System level programming** **3204 Logic programming** **4102 Network programming** **4103 Software engineering (2)** **4106 Project**
A21. Identify Modelling and design of computer-based systems bearing in mind the trade-offs	**1206 Operations Research** **2102 Data structures** **2201 System Analysis** **2206 Pattern recognition** **3101 Data base systems** **3103 System design** **3104 Human computer interfaces** **3106 Computer modelling and simulation** **3201 Computer networks** **3202 Computer graphics** **3203 Software engineering (1)** **3205 Analysis & design of algorithms** **4101 Artificial intelligence** **4103 Software engineering (2)** **4105 Computer vision** **4202Expert systems** **4202 Multimedia** **4106 Project**
A22. Define the Criteria and specifications appropriate to specific problems, and plan strategies for their solution	**2201 System analysis** **3101 Data base systems** **3203 Software engineering (1)** **4106 Project**

A1.4.2.2 Intellectual

Program ILO	**Courses**
B1. Define traditional and non-traditional problems, set goals towards solving them, and observe results	**1102 Discrete structure** **1103 Physics** **1104 Mathematics (1)** **1202 Computer Packages** **1203 Electronics** **1204 Mathematics (2)** **1206 Operations Research** **2104 Mathematics (3)** **2203 Probability & statistics** **2102 Data structures** **2201 System analysis** **3106 Computer modelling and simulation** **3201 Computer networks** **3203 Software engineering (1)** **3205 Analysis & design of algorithms** **4101 Artificial intelligence** **4106 Project** **4104 Computer security** **4201 Expert systems** **4202 Multimedia** **4203 Compiler theory** **4204 VLSI**
B2. Perform comparisons between (algorithms, methods, techniques, etc.).	**1206 Operations Research** **2102 Data structures** **2104 Logic design** **2202 File organization** **2206 Pattern recognition** **3102 Operating system** **3103 System design** **3106 Computer modelling and simulation** **3201 Computer networks** **3202 Computer graphics** **3203 Software engineering (1)** **3205 Analysis & design of algorithms** **4101 Artificial intelligence** **4103 Software engineering (2)** **4104 Computer security** **4105 Computer vision** **4106 Project** **4203 Compiler theory** **4204 VLSI**
B3. Perform classifications of (data, results, methods, techniques, algorithms... etc.).	**2102 Data structures** **2103 Object oriented programming** **2202 File organization** **2206 Pattern recognition** **3101 Data base systems** **3104 Human computer interfaces** **3106 System level programming** **3202 Computer graphics** **3204 Logic programming** **3205 Analysis & design of algorithms**

Program ILO	Courses
	4101 Artificial intelligence **4102 Network programming** **4201 Expert systems** **4202 Multimedia** **4106 Project**
B4. Identify attributes, components, relationships, patterns, main ideas, and errors	**1101 Introduction to computers & application** **1103 Physics** **1105 English (1)** **1203 Electronics** **1205 English (2)** **1206 Operations Research** **2103 Object oriented programming** **2104 Logic design** **2105 Humanities** **Fundamentals of Management** **2201 System analysis** **2202 File organization** **2204 Computer organization** **2206 Pattern recognition** **3101 Data base systems** **3102 Operating system** **3103 System design** **3104 Human computer interfaces** **3105 System level programming** **3106 Computer modelling and simulation** **3201 Computer networks** **3202 Computer graphics** **3203 Software engineering (1)** **3204 Logic programming** **3205 Analysis & design of algorithms** **4101 Artificial intelligence** **4102 Network programming** **4106 Project** **4103 Software engineering (2)** **4201 Expert systems** **4202 Multimedia** **4203 Compiler theory** **4204 VLSI**
B5. Summarize the proposed solutions and their results	**3103 System design** **2203 Probability & statistics** **3201 Computer networks** **3203 Software engineering (1)** **3205 Analysis & design of algorithms** **4101 Artificial intelligence** **4106 Project** **4201 Expert systems**
B6. Restrict solution methodologies upon their results	**1201 Structured Programming** **1202 Computer Packages** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **3205 Analysis & design of algorithms** **4103 Software engineering (2)** **4106 Project**
B7. Establish criteria, and verify solutions	**1102 Discrete structure**

Program ILO	**Courses**
	1103 Physics **1104 Mathematics (1)** **1203 Electronics** **1204 Mathematics (2)** **1206 Operations Research** **2104 Mathematics (3)** **2104 Logic design** **2201 System analysis** **2203 Probability & statistics** **2206 Computer organization** **3101 Data base systems** **3106 Computer modelling and simulation** **3203 Software engineering (1)** **3205 Analysis & design of algorithms** **4103 Software engineering (2)** **4106 Project**
B8. Identify a range of solutions and critically evaluate and justify proposed design solutions	**1102 Discrete structure** **1104 Mathematics (1)** **1203 Electronics** **1204 Mathematics (2)** **1206 Operations Research** **2101 Mathematics (3)** **2104 Logic design** **2202 File organization** **2203 Probability & statistics** **2206 Computer organization** **3101 Data base systems** **3103 System design** **3106 Computer modelling and simulation** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project** **4202 Multimedia** **4202 VLSI**
B9. Solve computer science problems with pressing commercial or industrial constraint	**1201 Structured Programming** **3203 Software engineering (1)** **4106 Project**
B10. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints	**1201 Structured Programming** **2205 Humanities Fundamentals of Accounting** **3101 Data base systems** **4101 Artificial intelligence** **4106 Project** **4201 Expert systems** **4202 VLSI**
B11. (b20) Use investigative skills to research new and novel aspects of their work (NARS I G 9)	**2105 Humanities Fundamentals of Management** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
B12. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application).	**3101 Data base systems** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
B13. Analyze and evaluate a range of options in	**1201 Structured Programming**

Program ILO	**Courses**
producing a solution to an identified problem	**1206 Operations Research** **3106 Computer modelling and simulation** **3201 Computer networks** **4106 Project**
B14. Perform problem analysis from written descriptions; derive requirements specifications from an understanding of problems (analysis, synthesis).	**1105 English (1)** **1202 Computer Packages** **1205 English (2)** **2201 System analysis** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
B15. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline	**1101 Introduction to computers & application** **3106 Computer modelling and simulation** **3203 Software engineering (1)** **4103 Software engineering (2)** **4203 Compiler theory**
B16. 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	**2204 Computer organization** **3102 Operating system** **3201 Computer networks** **4104 Computer security**
B17. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences	**2201 System analysis** **3103 System design** **3205 Analysis & design of algorithms** **4106 Project**
B18. Evaluate the results of tests to investigate the functionality of computer systems	**3203 Software engineering (1)** **3204 Logic programming** **4102 Network programming** **4103 Software engineering (2)** **4106 Project**
B19. Address and apply professional, moral and ethical issues within the discipline. (NARS I G 8)	**3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**

A1.4.2.3 Professional/practical

Program ILO	**Courses**
C1. Use appropriate programming languages and design methodologies.	**1201 Structured Programming** **2101 Data structures** **2103 Object oriented programming** **2202 File organization** **2204 Computer organization** **3101 Data base systems** **3104 Human computer interfaces** **3105 System level programming** **3202 Computer graphics** **3204 Logic programming** **4101 Artificial intelligence** **4102 Network programming** **4106 Project** **4201 Expert systems** **4204 VLSI**
C2. Use appropriate web-based systems, tools and design methodologies	**4102 Network programming** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
C3. Use appropriate database systems	**3101 Data base systems** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
C4. Perform independent information acquisition and management, using the scientific literature and Web sources	**1101 Introduction to computers & application** **1105 English (1)** **1205 English (2)** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
C5. Specify, design, and implement computer-based systems.	**1201 Structured Programming** **2101 Data structures** **2103 Object oriented programming** **2104 Logic design** **2201 System analysis** **2202 File organization** **2204 Computer organization** **3101 Data base systems** **3103 System design** **3104 Human computer interfaces** **3105 System level programming** **3203 Software engineering (1)** **3204 Logic programming** **3205 Analysis & design of algorithms** **4101 Artificial intelligence** **4102 Network programming** **4103 Software engineering (2)** **4105 Computer vision** **4106 Project** **4201 Expert systems** **4203 VLSI**
C6. Evaluate systems in terms of general quality attributes and possible trade-offs	**1103 Physics** **1203 Electronics**

Program ILO	Courses
presented within the given problem.	**1206 Operations Research** **2102 Data structures** **2104 Logic design** **2201 System analysis** **2204 Computer organization** **3102 Operating system** **3103 System design** **3106 Computer modelling and simulation** **3201 Computer networks** **3203 Software engineering (1)** **3205 Analysis & design of algorithms** **4101 Artificial intelligence** **4103 Software engineering (2)** **4104 Computer security** **4106 Project** **4202 Expert systems** **4203 VLSI**
C7. Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video.	**2202 File organization** **3101 Data base systems** **3202 Computer graphics** **4102 Network programming** **4202 Multimedia** **4106 Project**
C8. Apply the principles of human-computer interaction to the evaluation and construction of a wide range of materials including user interfaces, web pages, and multimedia systems	**3104 Human computer interfaces** **4102 Network programming** **4202 Multimedia** **4106 Project**
C9. Identify any risks or safety aspects that may be involved in the operation of computing equipment within a given context.	**1203 Electronics** **2104 Logic design** **2201 System analysis** **2202 File organization** **3102 Operating system** **3103 System design** **3201 Computer networks** **3203 Software engineering (1)** **4103 Software engineering (2)** **4104 Computer security** **4106 Project**
C10. Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems.	**1202 Computer Packages** **2103 Object oriented programming** **2202 File organization** **2206 Pattern recognition** **3101 Data base systems** **3102 Operating system** **3104 Human computer interfaces** **3105 System level programming** **3201 Computer networks** **3202 Computer graphics** **3203 Software engineering (1)** **3204 Logic programming** **3205 Analysis & design of algorithms** **4101 Artificial intelligence** **4102 Network programming** **4103 Software engineering (2)** **4106 Project**

Program ILO	Courses
	4202 Multimedia **4203 Compiler theory**
C11. Make effective use of general computing facilities, plan and manage a project to complete within budget and schedule.	**2105 Humanities** **Fundamentals of Management** **2205 Humanities** **Fundamentals of Accounting** **3102 Operating system** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
C12. Appreciate and manage the need for continuing professional development in recognition of the need for lifelong	**1105 English (1)** **1205 English (2)** **2105 Humanities** **Fundamentals of Management** **4106 Project**
C13. Communicate effectively by oral, written and visual means	**1105 English (1)** **1205 English (2)** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
C14. Operate computing equipment efficiently, taking into account its logical and physical properties.	**2204 Computer organization** **3102 Operating system** **3201 Computer networks**
C15. Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy	**1105 English (1)** **1202 Computer Packages** **1205 English (2)** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
C16. Apply tools and techniques for the design and development of applications.	**1102 Discrete structure** **1104 Mathematics (1)** **1204 Mathematics (2)** **1206 Operations Research** **2101 Mathematics (3)** **2102 Data structures** **2103 Object oriented programming** **2203 Probability & statistics** **2206 Pattern recognition** **3104 Human computer interfaces** **3105 System level programming** **3106 Computer modelling and simulation** **3204 Logic programming** **3205 Analysis & design of algorithms** **4102 Network programming**
C17. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material	**1101 Introduction to computers & application** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
C18. Handle a mass of diverse data, assess risk and draw conclusions	**2202 File organization** **3101 Data base systems** **3203 Software engineering (1)**

Program ILO	**Courses**
	4103 Software engineering (2)
C19. Prepare and present seminars to a professional standard	**1105 English (1)** **1202 Computer Packages** **1205 English (2)** **2105 Humanities** **Fundamentals of Management** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**

A1.4.2.4 General and Transferrable

Program ILO	**Courses**
D1. Communicate effectively by oral, written and visual means.	**1105 English (1)** **1205 English (2)** **2105 Humanities** **Fundamentals of Management** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
D2. Work effectively as an individual and as a member of a team	**2105 Humanities** **Fundamentals of Management** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
D3. Collaborate effectively within multidisciplinary team	**2105 Humanities** **Fundamentals of Management** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
D4. Work in stressful environment and within constraints	**2105 Humanities** **Fundamentals of Management** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
D5. Demonstrate efficient IT capabilities	**1101 Introduction to computers & application** **1202 Computer Packages** **2102 Data structures** **2103 Object oriented programming** **2201 System analysis** **2202 File organization** **2206 Pattern recognition** **3101 Data base systems** **3103 System design** **3104 Human computer interfaces** **3105 System level programming** **3201 Computer networks** **3202 Computer graphics** **4101 Artificial intelligence** **4102 Network programming** **4105 Computer vision** **4201 Expert systems** **4202 Multimedia**
D6. Lead and motivate individuals	**2105 Humanities**

Program ILO	Courses
	Fundamentals of Management **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
D7. Manage tasks and resources	**2105 Humanities** **Fundamentals of Management** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
D8. Search for information and adopt life-long self-learning	**1101 Introduction to computers & application** **1105 English (1)** **1205 English (2)** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
D9. Manage one's own learning and development	**1105 English (1)** **1203 Electronics** **1205 English (2)** **2104 Logic design** **2201 System analysis** **2204 Computer organization** **3103 System design** **3203 Software engineering (1)** **3205 Analysis & design of algorithms** **4103 Software engineering (2)** **4106 Project**
D10.Communicate effectively with team members, managers and costumers.	**1105 English (1)** **1205 English (2)** **2105 Humanities** **Fundamentals of Management** **2201 System analysis** **3103 System design** **3203 Software engineering (1)** **4103 Software engineering (2)** **4106 Project**
D11.Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension	**1102 Discrete structure** **1206 Operations Research** **2203 Probability & statistics** **2206 Pattern recognition** **3106 Computer modelling and simulation**
D12.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	**1105 English (1)** **1205 English (2)** **1202 Computer Packages** **2105 Humanities** **Fundamentals of Management** **2201 System analysis** **3101 Data base systems** **3103 System design**

Program ILO	**Courses**
	3203 Software engineering (1) **4103 Software engineering (2)** **4106 Project**

A1.4.2.5 Courses- Program ILOs Matrix

The Courses- Program ILOs Matrix is provided in an attached Excel file.

C. APPENDICES

Appendix (1): Program Matrices

Appendix A1.5 Teaching and Learning Methods vs. Program Courses

The following Matrix represents Teaching and learning strategies and teaching and learning activities for computer science courses:

code	Courses	Teaching and learning strategies											Teaching and learning activities			
		cooperative learning	Brainstorming	Self-education	experiential learning	indirect learning	E-learning	Problem solving	Inductive	Concept Map	Asy.-eLearning	Synch-eLearning	Blended Learning	Project	individual search	group search	software design
1101	Introduction to computers & application					√	√	√		√	√	√	√				√
1102	Discrete structure					√	√	√	√		√	√	√				
1103	Physics				√	√	√	√	√		√	√	√		√		
1104	Mathematics (1)					√	√	√	√		√	√	√		√		
1105	English (1)					√	√		√	√	√	√	√		√		
1201	Structured Programming	√		√	√	√	√	√	√	√	√	√	√				√

1202	**Computer Packages**	√		√	√	√	√				√	√	√	√		√	√
1203	**Electronics**					√	√	√	√		√	√	√				√
1204	**Mathematics (2)**					√	√				√	√	√		√		
1205	**English (2)**					√	√				√	√	√		√		
1206	**Operations Research**					√	√	√	√		√	√	√		√		
2101	**Mathematics (3)**					√	√				√	√	√		√		
2102	**Data structures**	√		√	√	√	√	√	√		√	√	√	√		√	√
2103	**Object oriented programming**	√		√	√	√	√	√	√		√	√	√	√		√	√
2104	**Logic design**				√	√	√				√	√	√				√
2105	**Humanities**		√			√	√				√	√	√		√		
2201	**System analysis**	√		√	√	√	√			√	√	√	√	√		√	
2202	**File organization**	√		√		√	√				√	√	√	√		√	√
2203	**Probability & statistics**					√	√				√	√	√	√	√	√	
2204	**Computer organization**	√		√		√	√				√	√	√				√
2205	**Humanities**		√			√	√				√	√	√		√		
2206	**Pattern recognition**			√		√	√	√	√		√	√	√				√

2202	**File organization**	√		√		√	√				√	√	√	√		√	√
2203	**Probability & statistics**					√	√				√	√	√	√	√	√	
2204	**Computer organization**	√		√		√	√				√	√	√				√
2205	**Humanities**		√			√	√				√	√	√		√		
2206	**Pattern recognition**			√		√	√	√	√		√	√	√				√
3101	**Database systems**	√		√	√	√	√	√	√	√	√	√	√	√		√	√
3102	**Operating system**			√	√	√	√	√			√	√	√				√
3103	**System design**	√		√	√	√	√			√	√	√	√	√		√	
3104	**Human computer interfaces**	√		√	√	√	√			√	√	√	√				√
3105	**Advanced programming**	√		√	√	√	√	√	√		√	√	√				√
3106	**Computer modelling and simulation**			√	√	√	√	√	√		√	√	√				√
3206	**Human rights**		√			√	√				√	√	√		√		
3201	**Computer networks**	√		√	√	√	√				√	√	√				√
3202	**Computer graphics**	√		√	√	√	√	√	√		√	√	√	√		√	√
3203	**Software engineering (1)**	√		√	√	√	√			√	√	√	√	√		√	√
3204	**Logic programming**			√	√	√	√	√	√		√	√	√				√
3205	**Analysis & design of algorithms**			√	√	√	√	√	√		√	√	√	√		√	√
4101	**Artificial intelligence**	√		√	√	√	√	√	√		√	√	√	√		√	√
4102	**Network programming**	√		√	√	√	√				√	√	√	√		√	√
4103	**Software engineering (2)**	√		√	√	√	√			√	√	√	√	√		√	√

4104	**Computer security**					√	√				√	√	√				
4105	**Computer vision**	√		√	√	√	√	√	√		√	√	√	√		√	√
4201	**Expert systems**	√		√	√	√	√				√	√	√	√		√	√
4202	**Multimedia**	√		√	√	√	√	√			√	√	√	√		√	√
4203	**Compiler theory**	√		√	√	√	√	√	√		√	√	√	√		√	√
4204	**VLSI**			√	√	√	√				√	√	√	√		√	√
4205	**Project**	√		√	√	√	√	√	√	√	√	√	√	√		√	√

C. APPENDICES

Appendix (1): Program Matrices

Appendix A1.6 Assessment Methods vs. Program Courses

The following Matrix represents Teaching and learning strategies and Teaching and learning activities for computer science courses:

Code	Course Name	Assessment Strategies			
		Midterm Exam	Final Exam	Practical Exam	Electronic quiz
1101	Introduction to computers & application	√	√	√	√
1102	Discrete structure	√	√		√
1103	Physics	√	√	√	√
1104	Mathematics (1)	√	√		√
1105	English (1)	√	√		√
1201	Structured Programming	√	√	√	√
1202	Computer Packages	√	√	√	√
1203	Electronics	√	√		√
1204	Mathematics (2)	√	√		√
1205	English (2)	√	√		√
1206	Operations Research	√	√		√
2101	Mathematics (3)	√	√		√
2102	Data structures	√	√	√	√
2103	Object oriented programming	√	√	√	√
2104	Logic design	√	√		√
2105	Humanities	√	√		√
2201	System analysis	√	√		√
2202	File organization	√	√	√	√
2203	Probability & statistics	√	√		√

Code	Course Name	Assessment Strategies			
		Midterm Exam	Final Exam	Practical Exam	Electronic quiz
2204	Computer organization	√	√		√
2205	Humanities	√	√		√
2206	Pattern recognition	√	√		√
3101	Database systems	√	√	√	√
3102	Operating system	√	√	√	√
3103	System design	√	√		√
3104	Human computer interfaces	√	√		√
3105	Advanced programming	√	√		√
3106	Computer modelling and simulation	√	√		√
3206	Human rights	√	√		√
3201	Computer networks	√	√	√	√
3202	Computer graphics	√	√		√
3203	Software engineering (1)	√	√	√	√
3204	Logic programming	√	√	√	√
3205	Analysis & design of algorithms	√	√		√
4101	Artificial intelligence	√	√	√	√
4102	Network programming	√	√		√
4103	Software engineering (2)	√	√	√	√
4104	Computer security	√	√		√
4105	Computer vision	√	√		√
4201	Expert systems	√	√	√	√
4202	Multimedia	√	√	√	√
4203	Compiler theory	√	√		√
4204	VLSI	√	√		√
4205	Project	oral	oral		

C. APPENDICES

Appendix (2): Contents of Program Courses

CODE NO.	COURSE NAME	WEEKLY HOURS	
1101	Introduction to Computer & Applications	LEC.: 3	EXC.: 4
This course introduces the components of a computer system that includes hardware for data storage, data manipulation & data communication. System software that include operating system, programming language translators & others. First principles of writing algorithms, programming& software development are introduced .The concept of: computer science, information system, decision support systems & information technology are to be presented how to use the operating systems like windows.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
1102	Discrete Structure	LEC.: 3	EXC.: 2
Sets, sequence, algorithms & pseudo code, induction & recursion. Relation & function. Graphs, Trees, Posts, Lattices & Boolean Algebra. Semi groups &groups, matrices.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
1103	Physics	LEC.: 3	EXC.: 4
Units & Dimensions, Electric charge; Coulomb's law; Electric field, Gauss law; Electric Potential; Electric capacitance &capacitor; Electric current; Resistors; Kerchief's law; magnetic field & forces; magnetic induction & inductors; Basic circuit theory & circuit analysis; fundamentals of three phase circuits & transformers.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
1104	Mathematics (1)	LEC.: 3	EXC.: 2
Number systems, real & complex numbers, variables, binomial theorem, partial fraction, polynomials, limit, continuity, derivatives of algebraic, trigonometric, inverse trigonometric, exponential, logarithmic fractions, applications of the derivative. Integral: fundamental integration formulas, integration by parts, types of integrals, application of indefinite & definite integrals (plane area, volume of solids, length of arc, … etc).			

CODE NO.	COURSE NAME	WEEKLY HOURS	
1105	English (1)	LEC.: 3	EXC: 2
This course focuses on the Development of basic composition & reading skills. Reading materials must be chosen from technical sources including: computers today, Input / output devices, storage devices, basic software, creative software, programming and computers tomorrow .			

CODE NO.	COURSE NAME	WEEKLY HOURS	
1201	Structured programming	LEC.: 3	EXC: 4
Problem solving & algorithm development. Introduction to elementary data types & related operations & expressions syntax & semantics of high-level language such as C# .Built in functions in the programming language used, operator precedence, assignment statements, input-output statement, Boolean expressions, relational operator, defined functions & procedures, scope & parameter matching, use of arrays. Methods & Recursion.			

WEEKLY HOURS		COURSE NAME	CODE NO.
EXC: 5	LEC.: 2	Computer Packages	1202
Introduction, presentation of Software Packages. Creating & Editing document, Formatting, Autocorrecting. Creating document with tables & Charts. Creating & Editing Worksheets. Creating Charts, Sorting. Building a Slide Presentation. Enhancing a presentation & Adding Graphs and Tables. Introduction to Academic Writing, Stages of Report Preparation.			

WEEKLY HOURS		COURSE NAME	CODE NO.
EXC: 3	LEC.: 3	Electronics	1203
Fundamentals of semiconductor devices; P-N junction diode, bipolar junction & field effect transistor structures; semiconductor devices as circuit elements; fundamentals of filters; power supply & rectifications; amplifiers; introduction to digital circuits. Introduction to microprocessors, microprocessor architecture: the CPU, memory, input/output, bus structure, comparison of typical microprocessor, Complete microprocessor instruction sets, microprocessor system bus. The latest microprocessors: Pinots, clock circuitry, address bus, data bus & control bus connections, reset, interrupts, direct memory access, microprocessor testing & logic analyzer. Memory interface: memory devices, timing consideration, address decoding, static & dynamic memory system, interrupt processed I/O, microprocessor-based communication, direct memory access. Application examples.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
1204	Mathematics (2)	LEC.: 3	EXC.: 2
Plan geometry: line, circle, conic sections equations. space geometry: line, plane, sphere, cone, cylinder quadratic equations. Advanced calculus: calculus of several variables, gradient, and multiple integrations. Vector algebra, vector functions & their derivatives, motion in space, vector fields, line and surface integrals, green's theorem, divergence theorem, & stock's theorem.			

WEEKLY HOURS		COURSE NAME	CODE NO.
EXC.: 2	LEC.: 3	English (2)	1205
The course must be designed to develop the student's proficiency in: oral presentation, report writing & communication skills.			

WEEKLY HOURS		COURSE NAME	CODE NO.
EXC.: 2	LEC.: 3	Operation research	1206
Linear programming: Formulation & graphical solution & algebraic solution. Transportation & assignment problems. Project scheduling by PERT-CPM, Markov state diagram, and Queuing theory: open Queues & closed Queues with several distribution. Application problems for computer structures of pipelining.			

Second Year

CODE NO.	COURSE NAME	WEEKLY HOURS	
2101	Mathematics (3)	LEC.: 3	EXC.: 2
Elementary course in matrix theory covering matrices, linear equations, determinates linear transformation and eigenvectors. Iterative methods for solving liner equation. Direct & iterative methods for solving linear system. Approximations of function. Derivatives & integrals-error analysis. Iterative methods for solving nonlinear equations. Linear difference equations. Applications to solutions of polynomial equations. Differentiation & integration formulas. Numerical solution of ordinary differential equations. Round off error bounds and study the total and partial differential equation and how to solve these equations.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
2102	Data structures	LEC.: 3	EXC.: 4
Introduction to Data Structures. Data types, Passing arguments and recursion. Arrays, Pointers, and Structures. Searching & Sorting. Classes & Garbage Collection. Linear lists. Stacks. Queues. Trees. Graphs. Course project.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
2103	Object oriented programming	LEC.: 3	EXC.: 4
The conceptual basis of Object Orientated Programming. Primitive data types and data types as objects. Data Abstraction and encapsulation. Object oriented programming: Inheritance Access control, Method hiding. Virtual methods and dynamic binding, method overriding. Object oriented programming: Polymorphism. Classes and object as abstract data types. Message passing. Operators, Operator overloading, delegates, and events. An object-oriented programming language syntax, creating objects from class definitions (e.g. C#). Exception handling.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
2104	Logic design	LEC.: 3	EXC.: 4
Identifying& understanding of physical components used in computer hardware. Numbering systems & codes, logic gates are introduced Minimization methods including Boolean algebra & expressions, and graphical simply combinational circuits; latches & flip-flops: analysis & design of synchronous sequential circuits; registers & counters, storage elements are introduced to aid the computer logic design.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
2105	Humanities (Elective)	LEC.: 3	EXC.: 1
Perception, Learning, motivation & value, individual difference & work performance, understanding and motivating oneself & others, working within groups, achieving success through goal setting, achieving high personal productivity and quality, achieving rewarding & satisfying career, communicating with people, leading & influencing others, building relationships with supervisors, coworkers & customers.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
2201	System Analysis	LEC.: 3	EXC.: 3
System analysis fundamentals (the role of the system analyst ,types of systems ,integrating, technologies for systems ,systems development life cycle , understanding organizational style and its impact on information systems, DFD , entity relationship model , determining feasibility and managing analysis and design activities) Information requirements analysis (sampling , workflow analysis, interviewing , using questionnaires, observing decision-maker behavior, prototyping) The analysis process (DFD, date dictionaries, process specification and structured decision, the system proposal).			

CODE NO.	COURSE NAME	WEEKLY HOURS	
2202	File organization & Processing	LEC.: 3	EXC.: 4
Introduction to the Design and Specification of File Structures. Fundamental file structure concepts. Secondary storage devices. Managing files of records. Reclaiming space in files. Organizing files for performance. Binary searching, Key sorting and Indexing. Co-sequential processing and external sorting. Tree-structured file systems. Hashing. Course project.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
2203	Probability & Statistics	LEC.: 3	EXC.: 3
Descriptive statistics. Tests of hypothesis. Correlation, regression & analysis of variance. Probability, sampling & statistical distributions.			

WEEKLY HOURS		COURSE NAME	CODE NO.
EXC.: 4	LEC.: 3	Computer Organization & Assembly Language	2204
Computer basic unit organization: Memory, control, arithmetic & logic unit. Computer cycles: Fetch, indirect addressing, execute & interrupt. Hardwired versus microprogramming control organization. I/O devices & interrupt handing. Interfacing and Communication. Assembly language is used in the lab, to demonstrate most of the above concepts, as well as developing the student's skills in Assembly language programming.			

WEEKLY HOURS		COURSE NAME	CODE NO.
EXC.: 1	LEC.: 3	Elective)(Humanities	2205
Functions of management: Planning: Organizational objectives – fundamentals of planning. Organizing: Fundamentals of organizing– responsibility, authority & delegation – organizational change & Leading: Leadership – motivation. Controlling: Principles of Controlling – production management & control. Information &Technology in modern management.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
2206	Pattern Recognition	LEC.: 3	EXC.: 3
Scope of pattern recognition: Numerical syntactic and structural, components of numerical pattern recognition system, process description, feature analysis, classifier design, luster analysis. Process description, syntactic, numerical, contextual, fuzzy, rule based. Feature analysis: preprocessing, feature extraction classification. Clustering: data description and clustering criteria hierarchical clustering applications. For speech and image recognition.			

Third Year

CODE NO.	COURSE NAME	WEEKLY HOURS	
3101	Database Systems	LEC.: 3	EXC.: 3
Introduction to Databases and database systems. Data Modeling Using the Entity-Relationship (ER) Model. The Relational Data Model and Relational Database Constraints.. Relational Database Design by ER- to-Relational Mapping. Structured Query Language (SQL), Data Definition, Constraints, and Schema Changes, Specifying Updates in SQL, Retrieval Queries in SQL. Views and data base programming. Functional Dependencies and Normalization. Enhanced Entity-Relationship (EER) Modeling. Data base programming project.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
3102	Operating systems	LEC.: 3	EXC.: 3
Basic concepts of computer systems hardware, software & firmware process concepts & processor scheduling. Memory organization & management for single user & multi-user systems. Virtual storage organization & management. Disk scheduling & its optimization discussion of major operating system. Concurrency. Laboratory work on many control programs as well as practice on a single & multi-user systems.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
3103	System design	LEC.: 3	EXC.: 3
Designing effective output , designing effective input , designing databases , designing user interfaces , designing data entry procedures , quality assurance through s/w engineering, documentation, testing, maintenance, auditing. Approaches for implementing information system, security, evaluation, users training.			

WEEKLY HOURS		COURSE NAME	CODE NO.
EXC.: 3	LEC.: 3	Human computer interfaces	3104
The relationship between people & machine, the role of human factors & psychology. Principles of interaction, interface design issues. Command languages, menus, windows, icons error messages, response time. Physical interaction, devises, interaction styles & techniques. The design process & user models. Interface evaluation; natural language & voice interfaces.			

WEEKLY HOURS		COURSE NAME	CODE NO.
EXC.: 3	LEC.: 3	System-level programming	3105
An introduction to programming at the level of the operating system topics include editors, system calls, programming tools , files , inter-process communication & shells, using the recent programming language .			

CODE NO.	COURSE NAME	WEEKLY HOURS	
3106	Elective Course (Computer modeling & simulation)	LEC.: 3	EXC.: 3
Basic concepts and terminology of simulation, probability and distribution theory, estimation and statistical tests, and generation of random numbers. Introduction to queuing theory, discrete system simulation, examples such as M/M/ 1 , Time management methods such as time driven and event driven simulation . Simulation languages, introduction to continuous systems simulation and examples.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
3201	Computer networks	LEC.: 3	EXC.: 3
Topology, structure, & architecture of computer networks. Layered protocols in point-to-point, broadcasting, & local area networks. The structure of some notable & public networks. Training on using LAN & WAN networks.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
3202	Computer graphics	LEC.: 3	EXC.: 3
Graphics algorithms, including ZD buffer and 3D concepts are introduced passing through, Graphics hardware, basic raster vector stroing, 3D transformation, synthesized camera models, curve & surface representation, lightening models, shading techniques, shadows, texture mapping, transparency.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
3203	Software Engineering (1)	LEC.: 3	EXC.: 3
Software Engineering Concepts & Historical Perspective. Software Life Cycle Paradigms. Software project management. The software process. System models. Software Requirements Definition. Unified Modeling Language (UML). Architectural design. Software design methodologies: object oriented design & software reusability. Rapid Application Development. Course project.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
3204	Logic Programming	LEC.: 3	EXC.: 3
Introduction: Facts, objects & predicates. Prolog variables: Using variables, bound & free variables, anonymous variables, compound goals, backtracking, variables rules .Variables in rules, prolog execution rules, using the trace, unification, execution control, the built in predicate. Simple I&O. Controlling execution: Success through failure, the fail predicate, execution using the fail predicate, recursion & the cut. Arithmetic operations. Compound objects. Dynamic database, lists. String operations.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
3205	Elective Course (Analysis & design of algorithms)	LEC.: 3	EXC.: 3
Algorithm concept. Analysis & complexity. Design methods such as Divide & conquer, concept passing through, binary search, merge sort, quick sort, selection and matrix multiplication. Greedy method concept passing through, shortest paths, Minimum spanning tree, optimal search trees. Backtracking: the general method, the 8 queens. Distributed algorithms.			

الرقم الكودى	اسم المقرر	عدد الساعات	
3206	حقوق الإنسان والسكان والبيئة	محاضرة : ساعتين	درس : -
تعريفات ومقومات وأهمية حقوق الإنسان – الإطار الفلسفى التاريخى – نشأتها وتطورها من العصور الإسلامية الى التنظيم الدولى . مصادر حقوق الإنسان الدولية والوطنية – أنواع حقوق الإنسان وواجباتها : الحقوق المدنية – السياسية – الاقتصادية – الاجتماعية والثقافية . كيفية حماية حقوق الإنسان – دور الأجهزة الغير حكومية فى حمايتها . التعريف بالسكان والبيئة – دراسة الوضع السكانى فى مصر وتطوره وآثاره – علاقة النظريات السكانية بالتنمية البشرية . أثر النمو السكاني على البيئة – مناقشة قضايا السكان والصحة .			

Fourth Year

WEEKLY HOURS		COURSE NAME	CODE NO.
EXC.: 3	LEC.: 3	Artificial intelligence	4101

Search techniques to problems solving. Heuristic search such as: generate and test, hill climbing, best–first search,.. etc. Knowledge representation such as: predicate logic, production rules, semantic networks, frames, … etc. planning: components of a planning system, goal stack planning, hierarchical planning. Common sense reasoning: commonsense ontologism, case – based reasoning. Natural language processing: syntactic processing, semantic analysis, discourse pragmatic processing.

CODE NO.	COURSE NAME	WEEKLY HOURS	
4102	Network Programming	LEC.: 3	EXC.: 3

Overview of internet protocols (HTTP, FTP, SMTP, POP3). Using HTML to construct web pages (fonts, colors, lists, hyperlinks, tables, images, creating animated GIFS, clickable image map, sound, video, frames). Using JavaScript language to add dynamic environment & interactivity to web pages. Active server pages (ASP).

WEEKLY HOURS		COURSE NAME	CODE NO.
EXC.: 3	LEC.: 3	Software Engineering (2)	4103

Software Testing Techniques: White box testing, black box testing, Unit testing, integration testing, Validation testing, system testing. Quality management: Quality Assurance and Standards, Quality Planning, Quality Control, Software measurements and metrics. Process Improvement: Process and Product Quality, Process Classification, Process Measurement, The SEI Process Capability Maturity Model Software. Maintenance :maintainability, Maintenance tasks. Change, Version and Release Management. Professional and Ethical responsibilities, Course Project

CODE NO.	COURSE NAME	WEEKLY HOURS	
4104	Computer Security	LEC.: 3	EXC.: 3

Overview: Characteristics of computer intrusion, point of security vulnerability, methods of defense. Basic encryption and decryption methods handling different types of ciphers, characteristics of good ciphers, crypt analysis. Secure encryption system including hard problems & complexity. Properties of arithmetic, public-key systems, single-key systems and the data encryption standard (DES), enhance cryptographic security. Security involving programs: information access problems, viruses and worms, controls against attack, operating system control, administrative controls. Design of secure operating systems such as models of security, penetration of operating systems, examples of security in general purpose operating systems. Database security such as reliability and integrity, sensitive data, the inference problem, multilevel data security. Personal

computer security such as security measures, protection for files, copy protection. Computer network security & communication security.

CODE NO.	COURSE NAME	WEEKLY HOURS	
4105	**Elective Course (Computer vision)**	**LEC.: 3**	**EXC.: 3**
Theories about the operation of the human visual system. Image understanding. Practical applications in robotics. Edge detection shape from shading. Stereo pictures. Optical flow. Fourier methods. Gradient space. Model-based computer vision: 2-d & 3-d representations, matching. Constrain relaxation, model-based vision systems.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
4106	**Project**	**LEC.: 1**	**EXC.: 5**
Students are allowed to choose among a number of projects, suggested by different staff members. The general aim of the project is to allow each student to integrate all the disciplines that are previously studied in unified chunk of knowledge. On the behavioral side, students are allowed to work in a team so as to practice working in collaborative environment. This emphasizes also proper documentation & presentation procedures.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
4201	**1.1. Expert System**	**LEC.: 3**	**EXC.: 3**
Expert system components: Knowledge base, inference engine, user inference. Knowledge acquisition methods. Knowledge representation: Rules, frames,…est. Inference engine design. Hands on experience by developing prototype expert system using expert system shell.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
4202	**Multimedia**	**LEC.: 3**	**EXC.: 3**
Multimedia components. Predictive & transform coding techniques. Vector quantization. Dictionary based text coding. Entropy encoding. Asthmatic coding. JPEG & MPEG standards. Motion estimation techniques. Multimedia database. Image retrieval by contents. Networking aspects of multimedia transmission.			

WEEKLY HOURS		COURSE NAME	CODE NO.
EXC.: 3	LEC.: 3	Elective Course (Compiler Theory)	4203
Introduction to compiler theory. Scanning (Lexical Analysis) & Finite Automata. Context- Free Grammars & Parsing, Top-Down Parsing, Bottom-Up Parsing. Semantic Analysis. Runtime Environment .Code Generation.			

CODE NO.	COURSE NAME	WEEKLY HOURS	
4204	Elective Course (VLSI Programming)	LEC.: 3	EXC.: 3
The basics of CMOS technology, circuit, layout & system design. Intended to be accompanied by.. Students will learn different design methodologies and algorithms of design synthesis, analysis. simulation & verification principles of validation & testing of manufactured chips. Important trends in modern design such as MCM (multi - chip modules) & FPGA (field - programming gate arrays) technology. Introduction to design techniques & tools to design large-scale integrated circuits. The goals are to design & analyze digital integrated circuits in CMOS technology and to use modern computer aided design tools. The approach is to start studying at the transistor level & then have them gradually build up to inverter & small logic circuits.			

C. APPENDICES

Appendix (3): Characteristics of computer science graduates

A3.1 General Characteristics

At a broad level, these characteristics can be expressed as follows:

1. Higher-level understanding of systems as a whole.
2. Understand not only the theoretical underpinnings of the discipline but also how that theory influences practice.
3. Significant project experience.
4. Adaptability: possess a solid foundation that allows them to maintain their skills as the field evolves.

A3.2 Abilities and skills

1. **Cognitive abilities and skills**

- Knowledge and understanding. Demonstrate knowledge and understanding of essential facts, concepts, principles, and theories relating to computer science and computer applications.

- Modeling. Use such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-off involved in design choices.

- Requirements. Analyze criteria and specifications appropriate to specific problems, and plan strategies for their solution.

- Critical evaluation and testing. Analyze the extent to which a computer-based system meets the criteria defined for its current use and future development.

- Methods and tools. Deploy appropriate theory, practices, and tools for the specification, design, implementation, and evaluation of computer-based systems.

- Professional responsibility. Recognize and be guided by the social, professional, and ethical issues involved in the use of computer technology.

2. Practical abilities and skills

- Design and implementation. Specify, design, and implement computer-based systems.

- Evaluation. Evaluate systems in terms of general quality attributes and possible tradeoffs presented within the given problem.

- Information management. Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video.

- Human-computer interaction. Apply the principles of human-computer interaction to the evaluation and construction of a wide range of materials including user interfaces, web pages, and multimedia systems.

- Tools. Deploy effectively the tools used for the construction and documentation of computer applications, with particular emphasis on understanding the whole process involved in using computers to solve practical problems.

- Operation. Operate computing equipment and software systems effectively.

3. Additional transferable skills

- Communication. Make succinct presentations to a range of audiences about technical problems and their solutions.

- Teamwork. Be able to work effectively as a member of a development team.

- Numeracy. Understand and explain the quantitative dimensions of a problem.

- Self management. Manage one's own learning and development, including time management and organizational skills

- Professional development. Keep abreast of current developments in the discipline to continue one's own professional development.

Appendix (4): Computer Science Jobs

The work of computer scientists falls into four categories: designing and implementing software; devising new ways to use computers; developing effective ways to solve computing problems; and planning and managing organizational technology infrastructure.

1. *Career Path 1: Designing and implementing software*:
    - Software Developers
    - System Analysts
    - System Designers
    - System and software testers
    - Software quality assurance
    - Project management
2. *Career Path 2: Devising new ways to use computers*
3. *Career Path 3: Developing effective ways to solve computing problems*
4. *Career Path 4: Planning and managing organizational technology infrastructure*
    - Computer Communications Specialists & computer network administrator
    - Operating System and Security Administrators
    - Data Base Administrators

C. APPENDICES

NARS Analysis

كخطوة أولية لتحديد نواتج التعلم المستهدفة لبرنامج علوم الحاسب تم تشكيل لجنة مكونة من منسق البرنامج وبعض أعضاء هيئة التدريس فى التخصص وذلك لدراسة المعايير الأكاديمية القومية (NARS) الخاصة بالبرنامج.

وقد خلصت الدراسة الى وجود بعض الملاحظات بخصوص بعض نواتج التعلم المحددة فى المعايير الأكاديمية القومية (NARS) كالتالى:

- تكرار لبعض المهارات العامة فى بعض المهارات التخصصية
- تصنيف بعض المهارات على أنها مهارات عملية وهى فى الأساس مهارات عامة
- صياغة بعض المهارات العملية بحيث تضم مهارات ذهنية
- صياغة بعض نواتج المعرفة بحيث تصبح مهارات

ويوضح الجدول التالى ملخص لهذه النقاط

1	تكرار لبعض المهارات العامة فى بعض المهارات التخصصية
	▪ الناتج رقم 6 من المهارات العامة 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 مكرر فى نواتج التعلم العملية: Specific ILOs (For Computer Science programs) 2. (C2) Communicate effectively by oral, written and visual means ▪ الناتج رقم 1 من المهارات العامة 1. (T1) Demonstrate the ability to make use of a range of learning resources and to manage one's own learning مكرر فى نواتج التعلم العملية: General ILOs (For Computing and Information programs): 5. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material ▪ الناتج رقم 3 من المهارات العامة 3. (T3) Show the use of information-retrieval مكرر فى نواتج التعلم العملية: General ILOs (For Computing and Information programs): 4. Apply computing information retrieval skills in computing community environment and industry
2	تصنيف بعض المهارات على أنها مهارات عملية وهى فى الأساس مهارات عامة

	تصنيف بعض المهارات على أنها مهارات عملية وهى فى الأساس مهارات عامة ▪ النواتج رقم 4،6 من المهارات العملية التخصصية Specific ILOs (For Computer Science programs) 4. (C5) Prepare and present seminars to a professional standard 6. (C7) Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy . حيث أن تقرير المراجعة أفاد بأن تقديم العروض وكتابة التقارير هى مهارة عامة
3	صياغة بعض المهارات العملية بحيث تضم مهارات ذهنية
	▪ الناتج رقم 6 من المهارات العملية العامة والناتج رقم 7 من المهارات العملية التخصصية General ILOs (For Computing and Information programs): 6. Design, implement, maintain, and manage software systems. Specific ILOs (For Computer Science programs) 7. (C8) Specify, design, and implement computer-based systems . حيث أن تقرير المراجعة أفاد بأن تحديد المتطلبات والتصميم هى مهارة ذهنية بينما البناء يعتبر مهارة عملية
4	صياغة بعض نواتج المعرفة بحيث تصبح مهارات
	▪ الناتج رقم 2 من نواتج المعرفة التخصصية 2. (A2) Use high-level programming languages تعتبر مهارة عملية Specific ILOs (For Computer Science programs) 1. (C1) Use appropriate programming languages,
5	تكرار لبعض نواتج التعلم
	▪ الناتج رقم 3 والناتج رقم 6 من المهارات العملية التخصصية Specific ILOs (For Computer Science programs) 3. (C4) Perform independent information acquisition and management, using the scientific literature and Web sources 5.(C6) Perform independent information acquisition and management, using the scientific literature and Web sources (redundant with 3) هو نفس الناتج وطبقا لتقرير المراجعة فإن هذا الناتج يكون مهارة عامة ▪ الناتج رقم 6 والناتج رقم 13 من المهارات العملية التخصصية Specific ILOs (For Computer Science programs) 6. (C7) Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy 13.(C13) Prepare technical reports, and a dissertation, to a professional standard (redundant with 6) هو نفس الناتج وطبقا لتقرير المراجعة فإن هذا الناتج يكون مهارة عامة

وغالبية الملاحظات التى وردت فى تقرير المراجعة الخارجية **(الزيارة الميدانية لإعتماد** المعهد عام 2015) كانت بسبب هذه النقاط.

وبناء على ذلك تم طلب الدعم الفنى من الهيئة لمناقشة هذه القضايا مع خبراء الهيئة.

وتم عقد ورشة عمل للدعم الفنى فى عام 2016. وأفاد خبراء الهيئة بضرورة الإلتزام بالمعايير الأكاديمية القومية (

NARS) الخاصة بالبرنامج بنفس الصياغة والتكرار مع إضافة بعض الكلمات التوضيحية .

Appendix (5): Reply to NAQAAE Comments

تقرير المراجعة الخارجية بتاريخ 2014/6/14

معيار المعايير الأكاديمية والبرامج التعليمية

#	Comment/Remark	Reply
	بالنسبة لهيكل البرنامج	
0	لم يتم تحديد نسب المجالات المعرفية:- (علوم الحاسبات الأساسية ,علوم الحاسبات التطبيقية ,العلوم الأختيارية) مما لا يمكن من التأكد من تحقيق الـ NARS.	Done refer to section 4. Curriculum Structure and Contents- 4.b.7 Compliance with NARS
	فحص توصيف البرنامج	
1	عدم الربط الدقيق بين مخرجات التعلم المستهدفة من البرنامج واهدافه في المصفوفة الخاصه بذلك حيث ورد بالمصفوفه أنواع المخرجات و لم تذكر المخرجات نفسها.	Done refer to Appendix (1): Program Matrices A1.1 Map of Program aims against Program ILOs
2	عدم استخدام كود لنواتج التعلم المستهدفه من البرنامج لتسهيل الرجوع اليها مثل A أو k للمعرفه و B أو I للمهارات الذهنية.	Done
	فحص مصفوفة المقارنة بين نواتج البرنامج ونواتج NARS	
3	عدم اتساق بعض نواتج التعلم المستهدفه للبرنامج مع النواتج المستهدفه من NARS و ذلك لاختلاف انواع النواتج مما يؤدي الي اختلاف المهارات المكتسبه في طبيعتها و طرق تعليمها و تعلمها و طرق تقويمها و ما سبق يدل علي عدم تحقيق مهارات ال NARS المذكوره في هذه الملحوظه	Done refer to Appendix (1): Program Matrices – A1.2 Matching the academic reference standards to the program's ILOs.
4	ناتج المعرفه و الفهم من NARS (A9) الذي يتحقق بالناتج العام للبرنامج D9)	Changed
5	ناتج المهارات الذهنيه من NARS (B5) يتحقق بمهارتين من البرنامج احداهما عمليه و هي C7 و الاخري عامه و هي D11 .	Changed
6	B7 من NARS يحققها ناتج البرنامجC11	Changed
7	B8 من NARS تحققها D4 من البرنامج	Changed
8	المهاره العامه من NARS (D3) تحققها المهاره العمليه للبرنامج C13	Changed
9	D4 من NARS تحققها C16 من البرنامج	Changed
10	D8 من NARS تحققها C5 من البرنامج	Changed
11	مهارات البرنامج العامه :- D3 , D5 , D6 , D7 , D9 , D10 , D12 , D13 , D14 لا تحقق ايه نواتج من NARS .	Removed
	فحص نواتج التعلم المستهدفة للبرنامج	Done refer to section B-2. Intended learning outcomes (ILOs)
12	الناتج A8 ليس مهاره معرفه و فهم و انما هي مهاره عمليه و مهنيه .	Changed
	المهارات الذهنية	
13	المهاره الذهنيه B9 يمكن تقسيمها الي مهاره ذهنيه و هي التصميم و مهاره عمليه مهنيه و هي التطبيق والتنفيذ.	Changed
14	المهارتين الذهنيتين B14 , B16 هما مهارتين عامتين و ليست ذهنيه	Changed
15	المهارات المهنيه C3 حتي C7 هي مهارات عامه و ليست مهنيه .	Changed for C3, C4, C5. For C6 the comment is in contradiction with NARS Professional skill specific No. 4 Also, for C7 the comment is in contradiction with NARS Professional skill specific No. 6
16	المهاره C9 هي مهاره ذهنيه و ليست مهنيه .	Changed
	المهارات العامة	
17	المهارات D3 , D4 , D5 , D6 , D7 , D12 , D13 , D14 ليست مهارات عامه	removed
	فحص مصفوفات البرنامج	

18	مصفوفات الربط بين المقررات و نواتج التعلم للبرنامج , الوارده بالملحق A1.3.1 , يمكن اعاده صياغتها في مصفوفه واحده لتسهيل التاكد من تحقيق جميع النواتج	Done refer to Appendix (1)- **A1.4.1** Courses-Program ILOs- Matrix
19	بعض نواتج التعلم المستهدفه للبرنامج تحقق بطريقه ليست تراكميه (بنائيه) لانها تحقق في مقرر واحد مثل C18 , C19 , D6 , A23 , A25 , A27 , A28 , A29 , A30 , A31 , A32,A33	Done refer to Appendix (1)- **A1.4.2 Program ILOs versus Courses**
20	- مراجعة تصميم توصيف البرنامج و المقررات فى ضوء ملاحظات المراجعة الخارجية .	Done
21	- مراجعة توافق مصفوفة مخرجات التعلم المستهدفة مع أهداف البرنامج .	Done refer to Appendix (1): Program Matrices-A1.1 Map of Program aims against Program ILOs
22	- مراجعة مصفوفة النتائج التعليمية المستهدفة للبرنامج لتتوافق مع النواتج التعليمية للمقررات .	Done
23	- إستضافة مراجعيين خارجيين .	Done

Appendix (6): Reply to NAQAAE Comments

تاريخ الزيارة الميدانية
10 - 12 ابريل 2017

معيار المعايير الأكاديمية والبرامج التعليمية (درجة استيفاء المعيار: مستوف)

#	Comment/Remark	Reply
	تصميم البرامج	
0	يوجد بعض الأخطاء اللغوية مثل مقرر CS1102- Discrete Math. وأحيانا أخرى يكتب CS1102- Discrete Structure	Done refer to course specification
	الاهداف العامة لبرنامج علوم الحاسب تحتاج ايضا الى مراجعة حيث ان عددهم كبير (11) وينصب معظمهم على مواصفات للطلاب والخريجين	Include general program aims in addition to aimed graduate attributes The Computer Science Program aims are articulated through statements of graduate attributes in compliance with NARS: ▪ Attributes of Computing and Information Programs Graduates; and ▪ Attributes of Computer Science Graduate.
	لم يتم استخدام افعال اجرائية في بعض النتائج التعليمية المستهدفة كما في برنامج علوم الحاسب مثل (a9 - a10 - a11 - a12).	Done refer to program specification
	المشروع (4205) في برنامج علوم الحاسب لا يكسب الطالب (طبقا لمصفوفة المقررات) الا مهارتين اثنين فقط وهما مهارتين عامتين (d11 - d12) بالرغم من ان توصيف المقرر يحوى مهارات ذهنية ومهنية	Done refer to course specification

Appendix (7): Plan to develop and improve the program to cope with labor market and recent trends in the specialization

أولا: مقدمة

نظرا لتأخر رد لجنة القطاع بالوزارة على اللائحة الجديدة للبرنامج بنظام الساعات المعتمدة والتى تواكب التطورات الحديثة ومستجدات التخصص ومراعاة متطلبات سوق العمل والتى قدمها المعهد منذ العام الجامعى 17/16.

وانتظارا لتطبيق اللائحة الجديدة اعتبارا من العام الجامعى 24/23 ، اتخذ مجلس القسم (محضر مجلس القسم رقم(5) فى مايو 2020) القرار باعداد خطة لتطوير برنامج علوم الحاسب الحالى لمواكبة متطلبات سوق العمل – الاتجاهات الحديثة فى علوم الحاسب والبدء فى تنفيذها فى الاعوام الجامعية 24/23-21/20

ثانيا: أهداف خطة التحسين والتطوير:

تم تحديد 8) محاور رئيسية للتطوير كالتالى:

1. المحور الأول: العمل مع الوزارة لاعتماد لائحة جديدة بنظام الساعات المعتمدة لمواكبة التطورات الحديثة ومستجدات التخصص ومراعاة متطلبات سوق العمل.
2. المحور الثانى: تحديث محتويات بعض المقررات الأساسية (Core Subjects) بإضافة موضوع مختار ((selected topic) يرتبط بالاتجاهات الحديثة فى التخصص
3. المحور الثالث: تحسين الجزء العملى للمقررات من خلال الادوات والبرمجيات المطلوبة فى سوق العمل
4. المحور الرابع: توجيه مشروعات التخرج والمشروعات الصغيرة بالمقررات لتتعامل مع الموضوعات والبرمجيات الحديثة المطلوبة لسوق العمل.
5. المحور الخامس: تطوير استراتيجيات التدريس والتعلم لتواكب طرق التدريس والتقويم المستجدة والتى نجمت عن ازمة كوفيد 19 من استخدام نظم التعليم الالكترونى والنظم التفاعلية عن بعد وتحسينها حيث اصبحت من الطرق الاساسية للتعليم والتقويم.
6. المحور السادس: التركيز على تنمية مهارات الطلبة للتعلم الذاتى بالمقررات الدراسية ومشروعات التخرج وتنمية مهارات البحث العلمى من خلال اشراك الطلبة في البحوث التطبيقية والمشاركة في المسابقات التتخصصية
7. المحور السابع: الاهتمام بتقديم برامج تدريب تخصصية للطلبة.
8. المحور الثامن: تطوير المعامل واقتناء معامل تخصصية

ثالثا: الخطة التنفيذية:

تعكس الخطة التنفيذية أخر تحديث للخطة فى بداية العام الدراسى 23/22

الخطة التنفيذية للتحسين والتطوير(20/21-23/24)

المحور الأول: اعتماد لائحة جديدة بنظام الساعات المعتمدة لمواكبة التطورات الحديثة ومستجدات التخصص ومراعاة متطلبات سوق العمل			
أنشطة التنفيذ	**التوقيت**	**مسئولية التنفيذ**	**مؤشرات المتابعة وتقييم الأداء**
1- اعداد لائحة جديدة طبقا للاطار المرجعى لقطاع معاهد وشعب علوم الحاسب ونظم المعلومات فى ديسمبر 20	**21-20**	**لجنة الجودة بالقسم أعضاء هيئة التدريس الهيئة المعاونة**	**الانتهاء من اعداد اللائحة واعتماد اللائحة**
2- اعداد لائحة جديدة بنظام الساعات المعتمدة طبقا للاطار المرجعى لقطاع معاهد وشعب علوم الحاسب ونظم المعلومات فى ديسمبر 21	**22-21**	**لجنة الجودة بالقسم أعضاء هيئة التدريس الهيئة المعاونة**	**الانتهاء من اعداد اللائحة واعتماد اللائحة**
3- اعتماد لائحة الساعات المعتمدة من قبل لجنة القطاع والتوصيف الكامل للبرنامج طبقا للائحة الساعات المعتمدة	**23-22**	**لجنة الجودة بالقسم أعضاء هيئة التدريس الهيئة المعاونة**	**توصيف البرنامج الجديد واستكمال الادلة والاجراءات والنظم اللازمة لبدء تطبيق البرنامج**
4- تنفيذ برنامج الساعات المعتمدة	**24-23**	**لجنة الجودة بالقسم أعضاء هيئة التدريس الهيئة المعاونة**	**اعـداد الطلبـة الملتحقـين بالبرنامج الجديد**

المحور الثانى: تحديث محتويات بعض المقررات الأساسية (Core Subjects) بإضافة موضوع مختار ((selected topic) يرتبط بالاتجاهات الحديثة فى التخصص			
أنشطة التنفيذ	**التوقيت**	**مسئولية التنفيذ**	**مؤشرات المتابعة وتقييم الأداء**
إضافة موضوع مختار ((selected topic) يرتبط بالاتجاهات الحديثة فى التخصص: **(تطوير تطبيقات الجوال - الحوسبة السحابية - معالجة الصور الرقمية - الواقع الإفتراضى - انترنت الأشياء - تعلم الآلة - النظم المدمجة - مستودعات البيانات - الامن السيبرانى - قواعد البيانات غير العلاقية - .....)**	**22-23** **23-24**	**أعضاء هيئة التدريس** **الهيئة المعاونة**	**اعداد المقررات**

المحور الثالث: تحسين الجزء العملى للمقررات من خلال الادوات والبرمجيات المطلوبة فى سوق العمل			
أنشطة التنفيذ	**التوقيت**	**مسئولية التنفيذ**	**مؤشرات المتابعة وتقييم الأداء**
اضافة الادوات والبرمجيات المطلوبة فى سوق العمل للجزء العملى من المقررات: (Flutter, Google Map, TensorFlow, Keras, Unity Game Engine, Google Services, Cloud Vision API, ----)	**21-20** **22-21** **23-22** **23-24**	**أعضاء هيئة التدريس** **الهيئة المعاونة**	**اعداد المقررات والبرمجيات**

المحور الرابع: توجيه مشروعات التخرج والمشروعات الصغيرة بالمقررات لتتعامل مع الموضوعات والبرمجيات الحديثة المطلوبة لسوق العمل			
أنشطة التنفيذ	**التوقيت**	**مسئولية التنفيذ**	**مؤشرات المتابعة وتقييم الأداء**
اختيار موضوعات وادوات وتقنيات تنفيذ المشاريع بما يتماشى مع متطلبات سوق العمل وخدمة المجتمع	**22/21**	**أعضاء هيئة التدريس** **الهيئة المعاونة**	**اعداد المشاريع لكل فئة**

المحور الخامس: تطوير استراتيجيات التدريس والتعلم لتواكب طرق التدريس والتقويم المستجدة والتى نجمت عن ازمة كوفيد 19 من استخدام نظم التعليم الالكترونى والنظم التفاعلية عن بعد وتحسينها حيث اصبحت من الطرق الاساسية للتعليم والتقويم			
أنشطة التنفيذ	**التوقيت**	**مسئولية التنفيذ**	**مؤشرات المتابعة وتقييم الأداء**
1- اعداد استراتيجية التعليم الهجين	**21-20**	**لجنة الجودة بالقسم أعضاء هيئة التدريس الهيئة المعاونة**	**نتائج استخدام طرق التدريس بالمقررات**
2- تحسين طرق التعليم الخاصة بالتعليم الالكترونى والنظم التفاعلية عن بعد وادخال نظم التقويم الالكترونية	**22-21**	**لجنة التعليم الالكترونى أعضاء هيئة التدريس الهيئة المعاونة**	**نتائج استخدام طرق التدريس والتقويم بالمقررات**
3- تحسين نظم التقويم اعتمادا على منصات التعليم الالكترونى ومنصات التفاعل من البعد وادخال نظم التقويم التكوينى (Formative Assessment)	**23-22**	**لجنة التعليم الالكترونى أعضاء هيئة التدريس الهيئة المعاونة**	**نتائج استخدام طرق التدريس والتقويم بالمقررات**

المحور السادس: التركيز على تنمية مهارات الطلبة للتعلم الذاتى بالمقررات الدراسية ومشروعات التخرج وتنمية مهارات البحث العلمى من خلال اشراك الطلبة في البحوث التطبيقية والمشاركة في المسابقات التتخصصية			
أنشطة التنفيذ	**التوقيت**	**مسئولية التنفيذ**	**مؤشرات المتابعة وتقييم الأداء**
1. تنمية مهارات الطلبة للتعلم الذاتى بالمقررات الدراسية ومشروعات التخرج	**-21/20 24/23**	**مجلس القسم أعضاء هيئة التدريس الهيئة المعاونة**	**اعداد التكليفات البحثية والمقررات**
2. وتنمية مهارات البحث العلمى من خلال اشراك الطلبة في البحوث التطبيقية	**-21/20 24/23**	**مجلس القسم أعضاء هيئة التدريس الهيئة المعاونة**	**اعداد البحوث التطبيقية**
3. المشاركة في المسابقات التتخصصية	**-21/20 24/23**	**مجلس القسم أعضاء هيئة التدريس الهيئة المعاونة**	**اعداد الطلبة والمسابقات**

المحور السابع: تقديم برامج تدريب تخصصية للطلبة			
أنشطة التنفيذ	**التوقيت**	**مسئولية التنفيذ**	**مؤشرات المتابعة وتقييم الأداء**
1. تقديم برامج تدريب تخصصية للطلبة والخريجين والهيئة المعاونة تتفق مع الاتجاهات الحديثة فى التخصص	**-21/20 24/23**	**لجنة التدريب وحدة التدريب**	**اعداد البرامج ونوعيتها واعداد الطلبة**
2- تقديم برامج ريادة الاعمال للطلبة والخريجين والهيئة المعاونة	**-21/20 24/23**	**لجنة التدريب وحدة التدريب وحدة التايكو**	**اعداد البرامج ونوعيتها واعداد الطلبة**

المحور الثامن: تطوير المعامل واقتناء معامل تخصصية			
أنشطة التنفيذ	**التوقيت**	**مسئولية التنفيذ**	**مؤشرات المتابعة وتقييم الأداء**
1. تطوير المعامل	**-21/20 24/23**	**لجنة التعليم الالكترونى وتطوير المعامل**	**اعداد المعامل والاجهزة**
2. اقتناء معامل تخصصية	**24-23**	**لجنة التعليم الالكترونى وتطوير المعامل**	**اعداد المعامل والاجهزة**

Computer Science Program

Program ILOs Covered

NARS ILOS / Program ILOS

	General ILOs	A.Knowledge and Understanding												Specific ILOs	B.Intellectual Skills																							Specific ILOs	C.Professional and practical skills																				Specific ILOs	D.General and transferable skills								
		K1. Concepts relating to computing and information	K2. Modelling and design of computer-based systems	K3. Tools, practices and methodologies	K4. Criteria and specifications appropriate to specific problems	K5. criteria defined for its current use and future development	K6. technologies that support computer processing	K7. generating tests	K8. Management and economics principles	K9. moral and ethical issues	K10. Current developments	K11. Requirements, practical constraints and computer-based systems		A1. essential mathematics relevant to computer science	A2. Use high-level programming languages	A3. core of analysis, algebra, applied mathematics and statistics	A4. analyzing data qualitatively	A5. a number of application areas i	A6. principles of artificial intelligence, image, and pattern recognition	A7. fundamental topics in Computer Science	A8. advanced topics		B1.Analyze computing problems and provide solutions	B2. concepts, theories behind computing and information	B3. criteria to measure and interpret the appropriateness	B4. evaluate alternative computer systems	B5. ideas, proposals and designs	B6. Evaluate the results of tests	B7. judgments considering costs, benefits, safety, quality, reliability	B8. Familiar with the professional, legal, moral and ethical issues	B9. Evaluate research papers		B1. Define traditional and non-traditional problems	B2. Perform comparisons	B3. Perform classifications	B4. Identify attributes, components, relationships, patterns	B5. Summarize the proposed solutions	B6. Restrict solution methodologies	B7. Establish criteria, and verify solutions	B8. critically evaluate and justify proposed design	B9. Solve computer science problems	B10. Generate an innovative design		P1. Operate computing equipment	P2. Implement computing knowledge and skills in projects	P3. Deploy the equipment and tools used for the construction	P4. Apply computing information retrieval skills	P5. Develop a range of fundamental research skills	P6. Design, implement, maintain, and manage software systems	P7. Assess the implications, risks	P8. Handle a mass of diverse data		C1. Use appropriate programming languages	C2. Communicate effectively	C3. Perform independent information acquisition	C4. Prepare and present seminars	C5. Perform independent information	C6. Prepare technical reports	C7. Specify, design, and implement computer-based systems	C8. Evaluate systems in terms of general quality	C9. effective information management	C10. human-computer interaction	C11. risks involved in the operation of computing equipment	C12. tools for building &docs	C13. technical reports		T1. learning resources and to manage one's own learning	T2. group working, team management, time	T3. use of information-retrieval	T4. mix of tools and aids in preparing and presenting reports	T5. numeracy skills	T6. communication skills	T7. use of general computing facilities	T8. life-long learning
A.Knowledge and Understanding																																																																					
A1. essential mathematics															√																																																										
A2. Use high-level languages																√																																																									
A3. Requirements, practical constraints													√																																																												
A4. core of analysis, algebra, applied mathematics																	√																																																								
A5. analyzing data qualitatively																		√																																																							
A6. application areas informed by the research directions											√								√																																																				
A7. principles of artificial intelligence, image, and pattern recognition		√																		√																																																			
A8. fundamental topics in computer systems		√																			√																																																	
A9. fundamental topics in computer science		√																			√																																																
A10. Selected advanced topics in HW, security, compiler, OS																					√																																															
A11. Selected advanced topics in o.o analysis & design & SE																					√																																													
A12. Selected advanced topics in AI& graphics																					√																																													
A13. fundamentals of programming, construction of computer systems		√																																																																	
A14. fundamentals of data structures , algorithms		√																																																																
A15. quality, reliability, enterprise, employment law ,accounting									√																																																									
A16. legal, professional and moral aspects										√																																																								
A17. tools, practices and methodologies for specification				√																																																															
A18. Measuring appropriateness					√																																																													
A19. technologies that support computer processing						√																																																											
A20. generating tests							√																																																										
A21. Modelling and design of computer-based systems			√																																																															
A22. specifications appropriate to specific problems					√																																																												
B.Intellectual Skills																																																																			
B1. Define traditional and non-traditional problems																																																																			
B2. Perform comparisons																																																																		
B3. Perform classifications																																																																	
B4. Identify attributes, components, relationships, patterns																																																																		
B5. Summarize the proposed solutions																																																																	
B6. Restrict solution methodologies upon their results																																																																		
B7. Establish criteria, and verify solutions																																																																	
B8. Identify a range of solutions																																																																	
B9. Solve computer science problems																																																																
B10. Generate an innovative design																																																																
B11. (b20) Use investigative skills to research new aspects																																																																	
B12. Create and/or justify designs to satisfy given requirements																																																																
B13. Analyze and evaluate a range of option																																																																
B14. Perform problem analysis																																																															
B15. Apply the concepts, principles, theories and practices																																																															
B16. Define and assess criteria to measure the appropriateness																																																															

B17. Synthesize ideas, proposals and designs																											√																																																	
B18. Evaluate the results of tests																												√																																																
B19. Address and apply professional, moral and ethical issues																														√																																													

NARS ILOS

Program ILOS

Program ILOs Covered

A.Knowledge and Understanding

General ILOs	Specific ILOs
	K1. Concepts relating to computing and information
	K2. Modelling and design of computer-based systems
	K3. Tools, practices and methodologies
	K4. Criteria and specifications appropriate to specific problems
	K5. criteria defined for its current use and future development
	K6. technologies that support computer processing
	K7. generating tests
	K8. Management and economics principles
	K9. moral and ethical issues
	K10. Current developments
	K11. Requirements, practical constraints and computer-based systems
	A1. essential mathematics relevant to computer science
	A2. Use high-level programming languages
	A3. core of analysis, algebra, applied mathematics and statistics
	A4. analyzing data qualitatively
	A5. a number of application areas i
	A6. principles of artificial intelligence, image, and pattern recognition
	A7. fundamental topics in Computer Science
	A8. advanced topics

B.Intellectual Skills

General ILOs	Specific ILOs
	J1.Analyze computing problems and provide solutions
	J2. concepts, theories behind computing and information
	J3. criteria to measure and interpret the appropriateness
	J4. evaluate alternative computer systems
	J5. ideas, proposals and designs
	J6. Evaluate the results of tests
	J7. judgments considering costs, benefits, safety, quality, reliability
	J8. Familiar with the professional, legal, moral and ethical issues
	J9. Evaluate research papers
	B1. Define traditional and non-traditional problems
	B2. Perform comparisons
	B3. Perform classifications
	B4. Identify attributes, components, relationships, patterns
	B5. Summarize the proposed solutions
	B6. Restrict solution methodologies
	B7. Establish criteria, and verify solutions
	B8. critically evaluate and justify proposed design
	B9. Solve computer science problems
	B10. Generate an innovative design

C.Professional and practical skills

General ILOs	Specific ILOs
	P1. Operate computing equipment
	P2. Implement computing knowledge and skills in projects
	P3. Deploy the equipment and tools used for the construction
	P4. Apply computing information retrieval skills
	P5. Develop a range of fundamental research skills
	P6. Design, implement, maintain, and manage software systems
	P7. Assess the implications, risks
	P8. Handle a mass of diverse data
	C1. Use appropriate programming languages
	C2. Communicate effectively
	C3. Perform independent information acquisition
	C4. Prepare and present seminars
	C5. Perform independent information
	C6. Prepare technical reports
	C7. Specify, design, and implement computer-based systems
	C8. Evaluate systems in terms of general quality
	C9. effective information management
	C10. human-computer interaction
	C11. risks involved in the operation of computing equipment
	C12. tools for building &docs
	C13. technical reports

D.General and transferable skills

General ILOs
T1. learning resources and to manage one's own learning
T2. group working, team management, time
T3. use of information-retrieval
T4. mix of tools and aids in preparing and presenting reports
T5. numeracy skills
T6. communication skills
T7. use of general computing facilities
T8. life-long learning

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
C1. Use appropriate programming languages and design methodologies	√	√	√										
C2. Use appropriate web-based systems, tools				√	√								
C3. Use appropriate database systems						√							
C4. Perform independent information acquisition and management							√						
C5. Specify, design, and implement computer-based systems								√					
C6. Evaluate systems in terms of general quality attributes									√				
C7. Apply information management, information-retrieval										√			
C8. Apply human-computer interaction to construction											√		
C9. Identify any risks												√	
C10. Deploy the tools used for the construction and documentation													√
C11. use of general computing facilities, plan and manage a project	√												
C12. professional development for lifelong learning.				√	√								
C13. (c21) Communicate effectively by oral, written and visual means		√											
C14. Operate computing equipment efficiently	√												
C15. (c20) Prepare and present seminars					√								
C16. Apply tools techniques for design ,development						√							
C17. research skills, through the use of online resources							√						
C18. Handle a mass of diverse data									√				
C19. Prepare and present seminars				√								√	

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
D1. Communicate effectively by oral, written and visual means										√		
D2. Work effectively as an individual and as a member of a team		√										
D3. Collaborate effectively within multidisciplinary team		√										
D4. Work in stressful environment and within constraints		√										
D5. (d7)Demonstrate efficient IT capabilities			√			√						
D6. (d8)Lead and motivate individuals		√										
D7. (d9)Manage tasks and resources		√										
D8. (d10)Search for information and adopt life-long self-learning.			√									√
D9. (d12)Manage one's own learning and development.	√											√
D10. (d14)Communicate effectively with team members, managers and costumers										√		
D11. (d15)Exhibit appropriate numeracy skills											√	
D12. (d17)Use an appropriate mix of tools and aids in preparing and presenting reports												√

Computer Science Program

Program ILOs Covered

A.Knowledge and Understanding

Program ILOS / Program Aims	A1. essential mathematics	A2. Use high-level languages	A3. Requirements, practical constraints	A4. core of analysis, algebra, applied mathematics	A5. analyzing data qualitatively	A6. application areas informed by the research directions	A7. principles of artificial intelligence, image, and pattern recognition	A8. fundamental topics in computer systems	A9. fundamental topics in computer science	A10. Selected advanced topics in HW, security, compiler, OS	A11. Selected advanced topics in o.o analysis & design & SE	A12. Selected advanced topics in AI& graphics	A13. fundamentals of programming, construction of computer systems	A14. fundamentals of data structures , algorithms	A15. quality, reliability, enterprise, employment law ,accounting	A16. legal, professional and moral aspects	A17. tools, practices and methodologies for specification	A18. Measuring appropriateness	A19. technologies that support computer processing	A20. generating tests	A21. Modelling and design of computer-based systems	A22. specifications appropriate to specific problems
1. to develop, in a flexible and progressive structure, students' knowledge and understanding of fundamental areas of computer science such as: algorithms, design and analysis, computational theory, computer architecture and software based systems , with the ability to use this knowledge to devise, specify, design, implement, test, document and critically evaluate computer-based systems								√	√	√	√		√	√								
2. To provide students with a sound understanding and how to apply mathematics, science to real world problems; as well as to analyze and interpret data	√			√	√																	
3. To provide students with the analytic skills necessary to effectively evaluate the relative merits of software and computer systems, and algorithmic approaches.																		√		√		
4. To provide students with a sound understanding and how to apply a wide range of principles and tools of software engineering, such as design methodologies, choice of algorithm, language, software libraries and user interface technique.		√							√								√					
5. To equip students with state-of-the-art knowledge and understanding of algorithms and data structures, computer organization and architecture, programming language concepts, networks, artificial intelligence, graphics, natural language processing, data mining, human computer interfaces, and databases, and identify and define the computing requirements for its solution.			√			√	√	√	√			√							√		√	√
6. To give students the opportunity to deepen their technical expertise in Designing, implementing, and evaluating a computer-based systems, process, component or program.																						
7. To develop the students' ability to use knowledge and understanding in the modeling and design of computer based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.																						
8. To prepare students for working effectively in teams in designing and implementing software systems and to equip them with management skills to be able to carry out a work plan with minimal supervision															√							
9. To develop the students understanding of the key ethical, moral, legal issues affecting computer science and their responsibilities as computer science professionals.															√	√						
10. To develop the students' ability to communicate, present and document ideas and concepts clearly and in an organized manner.																						
11. To equip the students' with independent learning skills and encourage an appreciation of the importance to computer science professionals of continuing professional development and lifelong learning																						

B.Intellectual Skills

Program ILOS / Program Aims	B1. Define traditional and non-traditional problems	B2. Perform comparisons	B3. Perform classifications	B4. Identify attributes, components, relationships, patterns	B5. Summarize the proposed solutions	B6. Restrict solution methodologies upon their results	B7. Establish criteria, and verify solutions	B8. Identify a range of solutions	B9. Solve computer science problems	B10. Generate an innovative design	B11. (b20) Use investigative skills to research new aspects	B12. Create and/or justify designs to satisfy given requirements	B13. Analyze and evaluate a range of option	B14. Perform problem analysis	B15. Apply the concepts, principles, theories and practices	B16. Define and assess criteria to measure the appropriateness	B17. Synthesize ideas, proposals and designs	B18. Evaluate the results of tests	B19. Address and apply professional, moral and ethical issues
1. to develop, in a flexible and progressive structure, students' knowledge and understanding of fundamental areas of computer science such as: algorithms, design and analysis, computational theory, computer architecture and software based systems , with the ability to use this knowledge to devise, specify, design, implement, test, document and critically evaluate computer-based systems								√	√			√			√	√		√	
2. To provide students with a sound understanding and how to apply mathematics, science to real world problems; as well as to analyze and interpret data	√	√	√	√															
3. To provide students with the analytic skills necessary to effectively evaluate the relative merits of software and computer systems, and algorithmic approaches.							√	√				√				√		√	
4. To provide students with a sound understanding and how to apply a wide range of principles and tools of software engineering, such as design methodologies, choice of algorithm, language, software libraries and user interface technique.		√	√			√													
5. To equip students with state-of-the-art knowledge and understanding of algorithms and data structures, computer organization and architecture, programming language concepts, networks, artificial intelligence, graphics, natural language processing, data mining, human computer interfaces, and databases, and identify and define the computing requirements for its solution.	√			√															
6. To give students the opportunity to deepen their technical expertise in Designing, implementing, and evaluating a computer-based systems, process, component or program.								√		√			√	√			√		
7. To develop the students' ability to use knowledge and understanding in the modeling and design of computer based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.								√		√			√	√			√		
8. To prepare students for working effectively in teams in designing and implementing software systems and to equip them with management skills to be able to carry out a work plan with minimal supervision	√																		
9. To develop the students understanding of the key ethical, moral, legal issues affecting computer science and their responsibilities as computer science professionals.																			√
10. To develop the students' ability to communicate, present and document ideas and concepts clearly and in an organized manner.					√														
11. To equip the students' with independent learning skills and encourage an appreciation of the importance to computer science professionals of continuing professional development and lifelong learning											√								

C.Professional and practical skills

Program ILOS / Program Aims	C1. Use appropriate programming languages and design methodologies	C2. Use appropriate web-based systems, tools	C3. Use appropriate database systems	C4. Perform independent information acquisition and management	C5. Specify, design, and implement computer-based systems	C6. Evaluate systems in terms of general quality attributes	C7. Apply information management, information-retrieval	C8. Apply human-computer interaction to construction	C9. Identify any risks	C10. Deploy the tools used for the construction and documentation	C11. use of general computing facilities, plan and manage a project	C12. professional development for lifelong learning.	C13. (C21) Communicate effectively by oral, written and visual means	C14. Operate computing equipment efficiently	C15. (C20) Prepare and present seminars	C16. Apply tools techniques for design ,development	C17. research skills, through the use of online resources	C18. Handle a mass of diverse data	C19. Prepare and present seminars
1. to develop, in a flexible and progressive structure, students' knowledge and understanding of fundamental areas of computer science such as: algorithms, design and analysis, computational theory, computer architecture and software based systems , with the ability to use this knowledge to devise, specify, design, implement, test, document and critically evaluate computer-based systems						√			√					√				√	
2. To provide students with a sound understanding and how to apply mathematics, science to real world problems; as well as to analyze and interpret data									√									√	
3. To provide students with the analytic skills necessary to effectively evaluate the relative merits of software and computer systems, and algorithmic approaches.						√			√									√	
4. To provide students with a sound understanding and how to apply a wide range of principles and tools of software engineering, such as design methodologies, choice of algorithm, language, software libraries and user interface technique.	√	√	√					√		√									
5. To equip students with state-of-the-art knowledge and understanding of algorithms and data structures, computer organization and architecture, programming language concepts, networks, artificial intelligence, graphics, natural language processing, data mining, human computer interfaces, and databases, and identify and define the computing requirements for its solution.											√			√					
6. To give students the opportunity to deepen their technical expertise in Designing, implementing, and evaluating a computer-based systems, process, component or program.	√	√	√		√			√		√						√			
7. To develop the students' ability to use knowledge and understanding in the modeling and design of computer based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.	√	√	√		√			√											
8. To prepare students for working effectively in teams in designing and implementing software systems and to equip them with management skills to be able to carry out a work plan with minimal supervision					√						√								
9. To develop the students understanding of the key ethical, moral, legal issues affecting computer science and their responsibilities as computer science professionals.																			
10. To develop the students' ability to communicate, present and document ideas and concepts clearly and in an organized manner.													√		√				√
11. To equip the students' with independent learning skills and encourage an appreciation of the importance to computer science professionals of continuing professional development and lifelong learning				√			√					√					√		

D.General and transferable skills

Program ILOS / Program Aims	D1. Communicate effectively by oral, written and visual means	D2. Work effectively as an individual and as a member of a team	D3. Collaborate effectively within multidisciplinary team	D4. Work in stressful environment and within constraints	D5. (D7)Demonstrate efficient IT capabilities	D6. (D8)Lead and motivate individuals	D7. (D9)Manage tasks and resources	D8. (D10)Search for information and adopt life-long self-learning.	D9. (D12)Manage one's own learning and development.	D10. (D14)Communicate effectively with team members, managers and costumers	D11. (D15)Exhibit appropriate numeracy skills	D12. (D17)Use an appropriate mix of tools and aids in preparing and presenting rep
1. to develop, in a flexible and progressive structure, students' knowledge and understanding of fundamental areas of computer science such as: algorithms, design and analysis, computational theory, computer architecture and software based systems , with the ability to use this knowledge to devise, specify, design, implement, test, document and critically evaluate computer-based systems					√						√	√
2. To provide students with a sound understanding and how to apply mathematics, science to real world problems; as well as to analyze and interpret data											√	
3. To provide students with the analytic skills necessary to effectively evaluate the relative merits of software and computer systems, and algorithmic approaches.											√	
4. To provide students with a sound understanding and how to apply a wide range of principles and tools of software engineering, such as design methodologies, choice of algorithm, language, software libraries and user interface technique.					√							√
5. To equip students with state-of-the-art knowledge and understanding of algorithms and data structures, computer organization and architecture, programming language concepts, networks, artificial intelligence, graphics, natural language processing, data mining, human computer interfaces, and databases, and identify and define the computing requirements for its solution.					√						√	
6. To give students the opportunity to deepen their technical expertise in Designing, implementing, and evaluating a computer-based systems, process, component or program.					√							
7. To develop the students' ability to use knowledge and understanding in the modeling and design of computer based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.					√							
8. To prepare students for working effectively in teams in designing and implementing software systems and to equip them with management skills to be able to carry out a work plan with minimal supervision		√	√	√	√	√	√				√	
9. To develop the students understanding of the key ethical, moral, legal issues affecting computer science and their responsibilities as computer science professionals.												
10. To develop the students' ability to communicate, present and document ideas and concepts clearly and in an organized manner.	√									√	√	√
11. To equip the students' with independent learning skills and encourage an appreciation of the importance to computer science professionals of continuing professional development and lifelong learning					√			√	√			

Computer Science Program

Program ILOs Covered

Program ILOS / Courses

A.Knowledge and Understanding

Courses	A1. essential mathematics	A2. Use high-level languages	A3. Requirements, practical constraints	A4. core of analysis, algebra, applied mathematics	A5. analyzing data qualitatively	A6. application areas informed by the research directions	A7. principles of artificial intelligence, image, and pattern recognition	A8. fundamental topics in computer systems	A9. fundamental topics in computer science	A10. Selected advanced topics in HW, security, compiler, OS	A11. Selected advanced topics in o.o analysis & design & SE	A12. Selected advanced topics in AI& graphics	A13. fundamentals of programming, construction of computer systems	A14. fundamentals of data structures , algorithms	A15. quality, reliability, enterprise, employment law ,accounting	A16. legal, professional and moral aspects	A17. tools, practices and methodologies for specification	A18. Measuring appropriateness	A19. technologies that support computer processing	A20. generating tests	A21. Modelling and design of computer-based systems	A22. specifications appropriate to specific problems
First Year - First Semester																						
1101 Introduction to computers & application								√	√				√	√								
1102 Discrete structure	√			√																		
1103 Physics				√	√																	
1104 Mathematics (1)	√			√																		
1105 English (1)																√						
First Year - Second Semester																						
1201 Structured Programming		√											√									
1202 Computer Packages																	√					
1203 Electronics								√														
1204 Mathematics (2)	√			√																		
1205 English (2)																√						
1206 Operations Research				√																	√	
Second Year - First Semester																						
2101 Mathematics (3)	√			√																		
2102 Data structures		√											√	√							√	
2103 Object oriented programming		√									√		√							√		
2104 Logic design								√														
2105 Humanities Fundamentals of Accounting															√	√						
Second Year - Second Semester																						
2201 System analysis			√								√		√		√		√				√	√
2202 File organization		√											√							√		
2203 Probability & statistics	√			√																		
2204 Computer organization								√		√					√			√	√			
2205 Humanities Fundamentals of Management															√	√						
2206 Pattern Recognition						√	√					√		√							√	
Third Year - First Semester																						
3101 Database systems					√				√											√	√	√
3102 Operating system								√		√								√	√			
3103 System design									√		√		√		√						√	
3104 Human computer interfaces		√											√							√	√	
3105 System level programming		√											√							√		
3106 Computer modelling and simulation														√							√	
Third Year - Second Semester																						
3201 Computer networks																		√	√		√	
3202 Computer Graphics												√									√	
3203 Software engineering (1)			√						√		√				√	√	√	√			√	√
3204 Logic programming		√											√							√		
3205 Analysis & design of algorithms				√										√							√	
3206Human rights																√						
Fourth Year - First Semester																						
4101 Artificial intelligence							√					√									√	
4102 Network programming		√				√							√	√						√		
4103 Software engineering (2)									√		√				√	√		√		√	√	
4104 Computer security										√								√	√			
4105 Computer vision						√						√									√	
4106 Project																						
Fourth Year - Second Semester																						
4201 Expert systems							√					√									√	
4202 Multimedia														√							√	
4203 Compiler theory										√												
4204 VLSI								√		√									√			
4205 Project																						

B.Intellectual Skills

Courses	B1. Define traditional and non-traditional problems	B2. Perform comparisons	B3. Perform classifications	B4. Identify attributes, components, relationships, patterns	B5. Summarize the proposed solutions	B6. Restrict solution methodologies upon their results	B7. Establish criteria, and verify solutions	B8. Identify a range of solutions	B9. Solve computer science problems	B10. Generate an innovative design	B11. (B20) Use investigative skills to research new aspects	B12. Create and/or justify designs to satisfy given requirements	B13. Analyze and evaluate a range of option	B14. Perform problem analysis	B15. Apply the concepts, principles, theories and practices	B16. Define and assess criteria to measure the appropriateness	B17. Synthesize ideas, proposals and designs	B18. Evaluate the results of tests	B19. Address and apply professional, moral and ethical issues
First Year - First Semester																			
1101 Introduction to computers & application				√											√				
1102 Discrete structure	√						√	√											
1103 Physics	√			√			√												
1104 Mathematics (1)	√						√	√											
1105 English (1)				√										√					
First Year - Second Semester																			
1201 Structured Programming						√			√	√			√						
1202 Computer Packages	√					√								√					
1203 Electronics	√			√			√	√											
1204 Mathematics (2)	√						√	√											
1205 English (2)				√										√					
1206 Operations Research	√	√		√			√	√					√						
Second Year - First Semester																			
2101 Mathematics (3)	√						√	√											
2102 Data structures	√	√	√																
2103 Object oriented programming			√	√															
2104 Logic design		√		√			√	√											
2105 Humanities Fundamentals of Accounting										√									
Second Year - Second Semester																			
2201 System analysis	√			√		√	√							√			√		
2202 File organization		√	√	√				√											
2203 Probability & statistics	√				√		√	√											
2204 Computer organization				√			√	√								√			
2205 Humanities Fundamentals of Management				√							√								
2206 Pattern Recognition		√	√	√															
Third Year - First Semester																			
3101 Database systems			√	√			√	√		√		√							
3102 Operating system		√		√												√			
3103 System design		√		√	√	√		√				√					√		
3104 Human computer interfaces			√	√															
3105 System level programming			√	√															
3106 Computer modelling and simulation	√	√		√			√	√					√		√				
Third Year - Second Semester																			
3201 Computer networks	√	√		√	√								√			√			
3202 Computer Graphics		√	√	√															
3203 Software engineering (1)	√	√		√	√	√	√	√	√		√	√		√	√			√	√
3204 Logic programming			√	√														√	
3205 Analysis & design of algorithms	√	√	√	√	√	√	√										√		
3206Human rights																			
Fourth Year - First Semester																			
4101 Artificial intelligence	√	√	√	√	√					√									
4102 Network programming			√	√														√	
4103 Software engineering (2)		√		√	√	√	√	√			√	√		√	√			√	√
4104 Computer security	√	√														√			
4105 Computer vision		√																	
4106 Project	√	√	√	√	√	√	√	√	√	√	√	√	√	√			√	√	√
Fourth Year - Second Semester																			
4201 Expert systems	√		√	√	√					√									
4202 Multimedia	√		√	√				√											
4203 Compiler theory	√	√		√											√				
4204 VLSI	√	√		√				√		√									
4205 Project																			

C.Professional and practical skills

Courses	C1. Use appropriate programming languages and design methodologies	C2. Use appropriate web-based systems, tools	C3. Use appropriate database systems	C4. Perform independent information acquisition and management	C5. Specify, design, and implement computer-based systems	C6. Evaluate systems in terms of general quality attributes	C7. Apply information management, information-retrieval	C8. Apply human-computer interaction to construction	C9. Identify any risks	C10. Deploy the tools used for the construction and documentation	C11. use of general computing facilities, plan and manage a project	C12. professional development for lifelong learning.	C13. (C21) Communicate effectively by oral, written and visual means	C14. Operate computing equipment efficiently	C15. (C20) Prepare and present seminars	C16. Apply tools techniques for design ,development	C17. research skills, through the use of online resources	C18. Handle a mass of diverse data	C19. Prepare and present seminars
First Year - First Semester																			
1101 Introduction to computers & application				√													√		
1102 Discrete structure																√			
1103 Physics						√													
1104 Mathematics (1)																√			
1105 English (1)				√								√	√		√				√
First Year - Second Semester																			
1201 Structured Programming	√				√														
1202 Computer Packages										√					√				√
1203 Electronics						√			√										
1204 Mathematics (2)																√			
1205 English (2)				√								√	√		√				√
1206 Operations Research						√										√			
Second Year - First Semester																			
2101 Mathematics (3)																√			
2102 Data structures	√				√	√										√			
2103 Object oriented programming	√				√					√						√			
2104 Logic design					√	√			√										
2105 Humanities Fundamentals of Accounting											√								
Second Year - Second Semester																			
2201 System analysis					√	√			√				√		√				√
2202 File organization	√				√		√		√	√								√	
2203 Probability & statistics																√			
2204 Computer organization	√				√	√								√					
2205 Humanities Fundamentals of Management											√	√							√
2206 Pattern Recognition										√						√			
Third Year - First Semester																			
3101 Database systems	√		√		√		√			√								√	
3102 Operating system						√			√	√	√			√					
3103 System design					√	√			√				√		√				√
3104 Human computer interfaces	√				√			√		√						√			
3105 System level programming	√				√					√						√			
3106 Computer modelling and simulation						√										√			
Third Year - Second Semester																			
3201 Computer networks						√			√	√				√					
3202 Computer Graphics	√						√			√									
3203 Software engineering (1)		√	√	√	√	√			√	√	√		√		√		√	√	√
3204 Logic programming	√				√					√						√			
3205 Analysis & design of algorithms					√	√				√						√			
3206Human rights																			
Fourth Year - First Semester																			
4101 Artificial intelligence	√				√	√				√									
4102 Network programming	√	√			√		√	√		√						√			
4103 Software engineering (2)		√	√	√	√	√			√	√	√		√		√		√	√	√
4104 Computer security						√			√										
4105 Computer vision					√														
4106 Project	√	√	√	√	√	√	√	√	√	√	√	√	√		√		√		√
Fourth Year - Second Semester																			
4201 Expert systems	√				√	√													
4202 Multimedia							√	√		√									
4203 Compiler theory										√									
4204 VLSI	√				√	√													
4205 Project																			

D.General and transferable skills

Courses	D1. Communicate effectively by oral, written and visual means	D2. Work effectively as an individual and as a member of a team	D3. Collaborate effectively within multidisciplinary team	D4. Work in stressful environment and within constraints	D5. (d7)Demonstrate efficient IT capabilities	D6. (D8)Lead and motivate individuals	d7. (d9)Manage tasks and resources	D8. (D10)Search for information and adopt life-long self-learning.	D9. (D12)Manage one's own learning and development.	D10. (D14)Communicate effectively with team members, managers and costumers	D11. (D15)Exhibit appropriate numeracy skills	D12. (D17)Use an appropriate mix of tools and aids in preparing and presenting reports
First Year - First Semester												
1101 Introduction to computers & application					√			√				
1102 Discrete structure											√	
1103 Physics												
1104 Mathematics (1)												
1105 English (1)	√							√	√	√		
First Year - Second Semester												
1201 Structured Programming												
1202 Computer Packages					√							√
1203 Electronics									√			
1204 Mathematics (2)												
1205 English (2)	√							√	√	√		
1206 Operations Research											√	
Second Year - First Semester												
2101 Mathematics (3)												
2102 Data structures					√							
2103 Object oriented programming					√							
2104 Logic design									√			
2105 Humanities Fundamentals of Accounting												
Second Year - Second Semester												
2201 System analysis	√	√			√				√	√		√
2202 File organization					√							
2203 Probability & statistics											√	
2204 Computer organization									√			
2205 Humanities Fundamentals of Management	√	√	√	√		√	√			√		
2206 Pattern Recognition					√						√	
Third Year - First Semester												
3101 Database systems					√							√
3102 Operating system												
3103 System design	√	√			√				√	√		√
3104 Human computer interfaces					√							
3105 System level programming					√							
3106 Computer modelling and simulation											√	
Third Year - Second Semester												
3201 Computer networks					√							
3202 Computer Graphics					√							
3203 Software engineering (1)	√	√	√			√	√	√	√	√		√
3204 Logic programming												
3205 Analysis & design of algorithms									√			
3206Human rights												
Fourth Year - First Semester												
4101 Artificial intelligence					√							
4102 Network programming					√							
4103 Software engineering (2)	√	√	√	√		√	√	√	√	√		√
4104 Computer security												
4105 Computer vision					√							
4106 Project	√	√	√	√		√	√	√	√	√		
Fourth Year - Second Semester												
4201 Expert systems					√						√	√
4202 Multimedia					√						√	√
4203 Compiler theory												√
4204 VLSI												√
4205 Project											√	√