ASSIUT UNIVERSITY

Information Systems
Undergraduate Program
2017-2018

Faculty of
Computers and Information

Dept. of Information Systems

Assiut University

Faculty of Computers & Information

Information Systems Undergraduate Program

(Credit Hours System)

2017-2018

Program Specifications

IS Undergraduate Program

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IS Program Specifications

A. Basic Information

1. **Program Title:** Information Systems
2. **Program Type:** Single
3. **Faculty (Faculties):** Faculty of Computers and Information
4. **Department:** Information Systems
5. **Assistant Coordinator: Dr.** Ahmed Taloba
6. **Coordinator:** Prof. Taysir H. Abdel-Hamid
7. **Last date of program specifications approval:** 2017-2018

B. Professional Information

1. Program Aims and Objectives

The program aims to provide the student with both breadth and depth of knowledge in the concepts and techniques related to the design, programming, and application of computing systems. Specifically, based on the constitutions of the Computing Curricula (ACM/IEEE IS2010 and IS2002) the IS program aims to provide the student with the ability to:

I. Improve Organizational Processes
II. Exploit Opportunities Created by Technology Innovations
III. Address Information Requirements
IV. Design and Manage Enterprise Architecture
V. Design, Develop, and Evaluate Solution and Sourcing Alternatives
VI. Securing Data and Infrastructure
VII. Manage and Control IT Risks

2. Graduate attributes

The Information Systems program is designed to provide the student with the foundations of the discipline as well as the opportunity for specialization. After successfully completing the Information systems program, the graduate should be able to:

I. Recognize problems that are amenable to computer information systems, and knowledge of the tools necessary for solving such problems.
II. Understand fundamentals of systems development life cycle (SDLC), information networks, information security, data mining, e-commerce, geographical information systems, and crisis management.
III. Manage and exploit organizational data and information; design data and information models, manage information systems development resources and projects.
IV. Implement solutions, including use of appropriate programming languages, web-based systems and tools, design methodologies, and database systems.

V. Apply the principles of effective information management, information organizations, information mining, and information-retrieval skills to information of various kinds, including text, images, sound, and video.
VI. Know the fundamentals of intelligent information systems technologies.
VII. Specify, design, and implement computer-based information systems, and evaluate them in terms of general quality attributes and possible tradeoffs presented within the given problem.
VIII. Apply IS solutions to functional, inter-organizational, operational, managerial, and executive problems and opportunities.
IX. Describe characteristics of various components of information systems, use the appropriate tools and techniques to analyze, design, and construct information systems.
X. Communicate effectively by oral, written and visual means.
XI. Work effectively as an individual and as a member of a team.
XII. Perform independent and efficient time management.
XIII. Recognize key ethical issues affecting information systems and their responsibilities as information science professionals.

3. Intended Learning Outcomes (ILOs)

a. Knowledge and Understanding

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

a1. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics.
a2. Demonstrate strong knowledge of information systems.
a3. Demonstrate strong skills of database management systems.
a4. Describe the principles and techniques of a number of application areas informed by the research directions of information systems.
a5. Explain the broad context within which information systems including issues such as quality and reliability.
a6. Identify information systems applications, such as accounting, health informatics, medical informatics, etc.
a7. Identify selected specialist fields at the forefront of information systems.
a8. Discuss the principles of Information communication and information security.
a9. Describe the challenges inherent in the maintenance and evolution of software systems, and the techniques and best practices currently available for dealing with them.
a10. Discuss some aspects of object-oriented analysis and design.
a11. Explain decision support tools and systems.
a12. Identify various approaches to Management Sciences (MS) such as Operation Management, Inventory Management, Project Management, and Supply Chain Management.
a13. Interpret and analyze data qualitatively and/or quantitatively.
a14. Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems, data structures and algorithms, software engineering techniques and information retrieval.
a15. Demonstrate a deep knowledge of business area analysis and the enterprise architecture.
a16. Define the tools, practices and methodologies used in the specification, design, implementation and critical evaluation of computer and information systems.
a17. Define the methods used in defining and assessing criteria for measuring the extent to which an information system is appropriate for its current deployment and future evolution.
a18. Describe the current and underlying technologies that support computer processing and inter-computer communication.
a19. Discuss developments in research fields across a range of knowledge areas.

b. Intellectual Skills

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

b1. Define traditional and nontraditional information systems problems, set goals towards solving them, and observe results.
b2. Perform comparisons between (methods, techniques...etc).
b3. Identify attributes, components, relationships, patterns, main ideas, and errors.
b4. Summarize the proposed solutions and their results.
b5. Restrict solution methodologies upon their results.
b6. Establish criteria, and verify solutions.
b7. Identify a range of solutions and critically evaluate and justify proposed design solutions.
b8. Solve information systems problems with pressing commercial or industrial constraints.
b9. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.
b10. Perform problem analysis from written descriptions;
b11. Derive requirements specifications from an understanding of problems (analysis, synthesis).
b12. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application).
b13. Solve a decision model with appropriate techniques.
b14. Solve complex problems within and between enterprises.
b15. Perform improvement of a system that benefits stakeholders.
b16. Recognize the professional, moral and ethical issues involved in the exploitation of Information Technology and be guided by their adoption, reflect on issues of professional practice within the discipline.
b17. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline.
b18. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences.
b19. Generate and evaluate the results of tests to investigate the functionality of information systems.

c. Professional and Practical Skills

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

c1. Use appropriate programming languages.
c2. Use appropriate web-based systems and tools, and design methodologies.
c3. Use appropriate database management systems.
c4. Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video.
c5. 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.
c6. Identify any risks or safety aspects that may be involved within a given context.
c7. 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.
c8. Implement data and model centered systems.
c9. Operate computing equipment effectively, recognizing its logical and physical properties, capabilities and limitations.
c10. Commercialize knowledge and skills to computing community and industry.

d. General and Transferable Skills

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

d1. Collaborate effectively within multidisciplinary team.

d2. Work in stressful environment and within constraints.
d3. Communicate effectively using a variety of communication methods.
d4. Communicate effectively with team members, managers and customers.
d5. Demonstrate efficient IT capabilities.
d6. Lead and motivate individuals.
d7. Manage tasks and resources.
d8. Search for information and adopt life-long self-learning.
d9. Acquire entrepreneurial skills.
d10. Acquire analytical thinking and problem solving skills
d11. Effectively employ information-retrieval skills, (including the use of browsers, search engines, and on-line library catalogues).
d12. Ability to work independently and as part of a team with minimum guidance.
d13. Manage one's own learning and development, including time management and organizational skills.
d14. Prepare their work in the form of reports, oral presentations or an internet web site.
d15. Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension.
d16. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material.

4. Academic standards

4a. External references for standards

The academic standards invoked in this specification are driven based on the National Academic Reference Standards (NARS) for "Computing" approved by the National Authority of Quality Assurance and Accreditation of Education on October 2010.

4b. Comparison of provision to external references

The computer science program 100% matches NARS reference

See the attached document "Program Matrices".

5. Curriculum Structure and Contents

5a. Program duration: 144 credit hours.

5b. Program structure

- No. of credit hours : Compulsory (100), Elective (44)
- Program Levels (in credit-hours system): 4 levels.

The following table summarizes the program structure.

Subject Area	Credit Hours	IS Program %	Tolerance
Humanities, ethical and Social Sciences (Univ. Req.)	18	12.5 %	8-10 %
Mathematics and Basic Sciences	28	19.44 %	16-18 %
Basic Computing Sciences (institution req.)	42	29.17 %	26-28 %
Applied Computing Sciences (specialization)	42	29.17 %	28-30 %
Projects and Training	14	9.72%	6-10 %
Subtotal	144	100 %	84-96 %
Optional (Institution character-identifying subjects)	15	N/A	4-16 %
Total	N/A	N/A	100 %

6. Program Courses

6a. Compulsory Courses

General requirements										
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs		
				Lect.	Lab	Exe.		a's	b's	c's	d's
HUM111	English Language I	2		2			1st	a1	b 1, b 2	c 1, c 2,c 3	d1, d 2, d 3, d4, d5, d6, d7
HUM121	Social Context of Computing	1	-	1				a 1, a 2, a 3	b 1, b 2, b 3	c 1, c 2, c 3	d1, d 2, d 3, d4, d5, d6, d7, d8, d9
HUM132	Interpersonal Communication	2	-	2				a 1, a 2, a 3	b 1, b 2, b 3	c 1, c 2, c 3	d1, d 2, d 3, d4, d5, d6, d7, d8, d9
HUM231	Business Administration	2	-	2				a1-a2	b1-b3	c1-c3	d1-d7
HUM232	Technical Writing	2	HUM111	2				a 1, a 2, a 3	b 1, b 2, b 3	c 1, c 2, c 3	d1-d9
HUM241	Computers and Ethics	1	-	1				a1-a2	b1-b3	c1-c3	d1-d7
Total		10									

Institution requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
MATH101	Mathematics I	3	-	3		1	1st	a1, a2	b2-b6	c1-c3	d1-d3
MATH102	Mathematics I I	3	MATH101	3		2		a1-a5	b1-b6	c1-c4	d1-d3
MATH202	Probability and Statistics	2	MATH102	2	**2** H[T]			a1-a5	b1-b6	c1-c4	d1-d3
CS201	Discrete Structures	3	MATH102	3		2		a1-a2	b1-b6	c1-c4	d1-d4
PHYS101	Physics I	3	-	2	**2** H[S]		1st	a1-a6	b1-b5	c1-c6	d1-d6
PHYS102	Physics II	3	-	2	**2** H[S]		2nd	a1, a13	b3, b7, b10	c4, c6, c9	d4, d6, d7, d12, d13
EE101	Electronics	3	-	2	**2** H[S]			a1	b2-b4, b6, b7	c6, c9	d2, d4, d6, d7, d12, d13
EE102	Digital Circuits	3	EE101	2	**2** H[S]			a1	b2-b4, b6, b7,	c6, c9	d2, d4, d6, d7, d12, d13

Basic Computing Since requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
CS141	Programming Fundamentals	3	IT101	3	**3** H^T			a1-a2, a4-a7	b1-b5	c1-c3	d1-d5
CS211	Data Structures and Algorithms	3	CS241	3	**2** H^T			a1-a5	b1-b11	c1-c7	d1-d5
CS241	Object-Oriented Programming	3	CS141	3	**2** H^T			a1-a5	b1-b5	c1-c7	d1-d5
CS322	Computer Architecture and Operating Systems	3	IT101, CS201	3	**2** H^T			a14, a19	b2,b17, b18,	c1, c7,	d2, d8, d13, d14, d16
CS391	Software Engineering	3	CS211	3		2		a2-a9	b1-b15	c1-c6	d1-d6
IS201	Foundations of Information Systems	3	IT101	3	**2** H^T			a1-a7	b1-b10	c1-c8	d1-d7
IS212	Databases	3	IS201	3	**2** H^T			a1-a8	b1-b4	c1-c6	d1-d7
IS231	Systems Analysis and Design	3	IT101	3		2		a1-a5	b1-b15	c1-c5	d1-d8
IT101	IT Fundamentals	3	-		**3** H^T		1st	a1-a9	b1-b4	c1-c4	d1-d4
IT251	Data Communications	3	IT101					a1-a7	b1-b4	c1-c5	d1-d6
IT351	Computer Networks	3	IT251, CE221					a1-a7	b1-b5	c1-c7	d1-d9
IT371	Web Programming	3	CS141, IT251					a1-a8	b1-b3	c1-c6	d1-d7

Specialization requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
IS311	Geographical Information Systems	3	IS201, IS212	3	**2** H^T			a1-a5	b1-b5	c 1-c5	d1-d6
IS341	Decision Support Systems	3	IS201	3	**2** H^T			a1-a8	b1-b8	c1-c7	d1-d6
IS342	IS Strategy, Management and Acquisition	3	IS201	3	**2** H^T			a1-a8	b1-b8	c1- c7	d1-d6
IS412	Distributed and Object Databases	3	IS212	3	**2** H^T			a 1 - a4	b 1-b6	c 1-c2	d1-d6
IT411	Information Assurance and Security	3	IT351	3	**2** H^O			a 1-a8	b 1-b6	c 1-c4	d 1-d 5
IT441	Enterprise Architecture	3	IT351	3	**2** H^O			a 1-a6	b1-b5	c1-c6	d1-d5

6b. Compulsory Courses (by levels)

Specialization requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
Level 1											
CS141	Programming Fundamentals	3	IT101	**3**	**3** H^T			a1-a9	b1-b4	c1-c3	d1-d5
IT101	IT Fundamentals	3	–	**3**	**3** H^T			a18	b3	c10	d5, d7, d13
MATH102	Mathematics I I	3	MATH101	3		2		a1-a5	b1-b6	c1-c4	d1-d3
MATH202	Probability and Statistics	2	MATH102	2	**2** H^T			a1-a5	b1-b6	c1-c4	d1-d3
CS201	Discrete Structures	3	MATH102	3		2		a1-a2	b1-b6	c1-c4	d1-d4
PHYS101	Physics I	3	-	2	**2** H^S		1st	a1-a5	b1-b5	c1-c5	d1-d5
PHYS102	Physics II	3	-	2	**2** H^S		2nd	a1, a13	b3, b7, b10	c4, c6, c9	d4, d6, d7, d12, d13
EE101	Electronics	3	-	2	**2** H^S			a1	b2-b4, b6, b7	c6, c9	d2, d4, d6, d7, d12, d13
EE102	Digital Circuits	3	EE101	2	**2** H^S			a1	b2-b4, b6, b7,	c6, c9	d2, d4, d6, d7, d12, d13
HUM111	English Language I	2		2			1st	a1	b 1, b 2	c 1, c 2,c 3	d1, d 2, d 3, d4, d5, d6, d7
HUM121	Social Context of Computing	1	-	1				a 1, a 2, a 3	b 1, b 2, b 3	c 1, c 2, c 3	d1, d 2, d 3, d4, d5, d6, d7, d8, d9
HUM132	Interpersonal Communication	2	-	2				a 1, a 2, a 3	b 1, b 2, b 3	c 1, c 2, c 3	d1, d 2, d 3, d4, d5, d6, d7, d8, d9
Subtotal		28									

Specialization requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours / week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
Level 2											
CS201	Discrete Structures	3	MATH102	3		2		a1-a2	b1-b6	c1-c4	d1-d4
CS211	Data Structures and Algorithms	3	CS241	3	**2** H^{T}			a1-a5	b1-b11	c1-c7	d1-d5
CS241	Object-Oriented Programming	3	CS141	3	**2** H^{T}			a1-a5	b1-b5	c1-c7	d1-d5
IS201	Foundations of Information Systems	3	IT101	3	**2** H^{T}			a1-a7	b1-b10	c1-c8	d1-d7
IS212	Databases	3	IS201	3	**2** H^{T}			a1-a8	b1-b4	c1-c6	d1-d7
IS221	Project Management	2	IT101	2	**2** H^{O}			a1-a2	b1-b2	c1	d1-d6
IS231	Systems Analysis and Design	3	IT101	3			2	a1-a5	b1-b15	c1-c5	d1-d8
IT251	Data Communications	3	IT101					a1-a7	b1-b4	c1-c5	d1-d6
HUM231	Business Administration	2	-	2				a1-a2	b1-b3	c1-c3	d1-d7
HUM232	Technical Writing	2	HUM111	2				a 1, a 2, a 3	b 1, b 2, b 3	c 1, c 2, c 3	d1-d9
HUM241	Computers and Ethics	1	-	1				a1-a2	b1-b3	c1-c3	d1-d7
Subtotal											

Specialization requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
Level3											
CS322	Computer Architecture and Operating Systems	**3**	IT101, CS201	**3**	**2** H^T			a14, a19	b2, b17, b18	c1,c7	d2, d8, d13, d14, d16
CS381	Software Development and Professional Practice	**3**	CS211, CS391	**3**	**3** H^O			a1-a10	b1-b15	c1-c6	d1-d6
CS382	Field Training	**3**	IS221	**3**				a1-a8	b1-b10	c1-c8	d1-d6
CS391	Software Engineering	3	CS211	3		2		a2-a9	b1-b15	c1-c6	d1-d6
IS311	Geographical Information Systems	3	IS201, IS212					a1-a5	b1-b5	c 1-c5	d1-d6
IS341	Decision Support Systems	3	IS201					a1-a8	b1-b8	c1-c7	d1-d6
IS342	IS Strategy, Management and Acquisition	3	IS201					a1-a8	b1-b8	c1- c7	d1-d6
IT351	Computer Networks	3	IT251, CE221					a1-a7	b1-b5	c1-c7	d1-d9
IT371	Web Programming	3	CS141, IT251					a1-a8	b1-b3	c1-c6	d1-d7
Subtotal		27									

Specialization requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
Level4											
IS412	Distributed and Object Databases	3	IS212					a 1 - a4	b 1-b6	c 1-c2	d1-d6
IS452	Capstone Project I	3	CS381, IS221	3	**4** H^S			a 1 - a11	b 1-b11	c 1-c6	d1-d9
IS453	Capstone Project II	3	CS381, IS221	3	**4** H^S			a 1 - a11	b 1-b11	c 1-c6	d1-d9
IT411	Information Assurance and Security	3	IT351					a 1-a8	b 1-b6	c 1-c4	d 1-d 5
IT441	Enterprise Architecture	3	IT351					a 1-a6	b1-b5	c1-c6	d1-d5
Subtotal		15									

6c. Elective Courses

General requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lect.	Lab	Exe.		a's	b's	c's	d's
HUM112	English Language II	2	HUM111	2	-	-	-	a 1	b 1-b2	c 1-c3	d 1-d7
HUM122	Intellectual Property	1	-	1	-			a 1-a2	b 1-b3	c 1-c4	d 1-d7
HUM131	Organizational Behavior	2	-	2	-			a 1-a2	b 1-b3	c 1-c3	d 1-d7
HUM133	Computing Economics	2	-	2	-			a 1-a6	b 1-b2	c 1-c4	d 1-d7
HUM141	Computer Law	2	-	2	-			a 1-a5	b 1-b5	c 1-c3	d 1-d7
HUM142	Privacy and Civil Liberties	1	-	1	-			a 1-a5	b 1-b5	c 1-c3	d 1-d3
HUM151	Hand Drawing	2	-	1	**3** H^S			a 1-a4	b 1-b4	c 1-c3	d 1-d3
HUM152	History of Computing	2	-	2	-			a 1-a9	b 1-b3	c 1-c4	d 1-d3
HUM153	Islamic Culture	1	-	1	-			a 1-a2	b 1-b3	c 1-c3	d 1-d3
HUM154	Scientific Thinking	1	-	1	-			a 1-a2	b 1-b2	c 1	d 1-d3
Total		8									

Institution requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practica.	tutorial		a's	b's	c's	d's
MATH201	Mathematics III	3	MATH102	3	**2** H^T	2		a1-a3	b1-b5	c 1-c4	d 1-d4
MATH301	Numerical Analysis	3	MATH102	3		2		a1-a3	b1-b6	c 1-c7	d 1-d7
CS301	Operation Research	3	CS201	3	**2** H^T			a1-a3	b1-b2	c 1-c3	
CS302	Simulation and Modeling	3	MATH202	3	**2** H^T			a1-a4	b1-b2	c1-c2	d1-d3
EE201	Digital Signal Processing	3	MATH201	3	**2** H^T			a1-a3	b1-b5	c1-c4	d1-d4
Total		6									

Basic Computing Since requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
CS341	Visual Programming	3	CS211	3	**2** H^T			a1-a6	b1-b5	c1-c5	d1-d6
CS351	Computer Graphics	3	IT101, CS201	3	**2** H^T			a1-a7	b1-b6	c1-c4	d1-d8
CS361	Artificial Intelligence	3	IT101, CS201		**2** H^T			a1-a7	b1-b8	c1-c6	d1-d8
IS211	File Organization	3	CS241	2	**2** H^T			a1-a9	b1-b4	c1-c6	d1-d6
MM301	Introduction to Multimedia Technology	3	CS241	3	**2 HT**			a1-a3	b1-b6	c1-c7	d1-d7
Total		6									

Specialization requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours / week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
IS321	Advanced Project Management	3	IS221	**3**				a1- a2	b1	c1	d1
IS411	Advanced Database	3	IS212	**3**	**2** H^O			a1- a3	b1- b4	c1- c2	d1- d6
IS413	Web Information Systems	3	IS201, IT371	**3**	**2** H^T			a1- a4	b1- b5	c1- c6	d1- d8
IS414	Data Mining and Business Intelligence	3	IS201	**3**	**2** H^T			a1- a4	b1- b5	c1- c2	d1- d8
IS415	Database Administration	3	IS212	**3**	**2** H^O			a1- a2	b1- b3	c1- c4	d1- d7
IS416	Transaction Processing	3	IS212	**3**	**2** H^O			a1- a9	b1- b4	c1- c6	d1- d6
IS417	Multimedia Databases	3	IS212, CS241	**3**	**2** H^O			a1- a2	b1- b4	c1- c6	d1- d6
IS441	Quality Assurance of Information Systems	3	IS201	**3**	**2** H^O			a1- a9	b1- b13	c1- c6	d1- d12
IS442	IS Application Development	3	IS212, IS413	**3**	**2** H^O			a1- a9	b1- b10	c1- c6	d1- d12
IS451	Social Information Systems	3	IS413	**3**	**2** H^O			a1- a2	b1- b3	c1- c3	d1- d7
IT471	E-commerce	3	IT371	**3**	**2** H^O			a1- a6	b1- b2	c1- c3	d1- d7
MM412	Human Computer Interaction	3	CS341	**3**	**2** H^T			a1- a8	b1- b8	c1- d8	d1- d12
Total		24									

6d. Elective Courses (by levels)

Specialization requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
Level 1											
HUM112	English Language II	**2**	HUM111	2	-	-	-	a1-a2	b1-b3	c1- c3	d1-d7
HUM122	Intellectual Property	**1**	-	1	-			a1-a2	b1-b3	c1- c3	d1-d7
HUM131	Organizational Behavior	**2**	-	2	-			a1-a2	b1-b3	c1- c3	d1-d7
HUM133	Computing Economics	**2**	-	2	-			a1-a6	b1	c1- c3	d1-d7
HUM141	Computer Law	2	-	2	-			a1-a5	b1-b5	c1, c3	d1-d4
HUM142	Privacy and Civil Liberties	1	-	1	-			a1-a3	b1-b4	c1, c3	d1-d3
HUM151	Hand Drawing	2	-	1	**3** H^S			a 1-a4	b 1-b4	c 1-c3	d 1-d3
HUM152	History of Computing	2	-	2	-			a 1-a9	b 1-b3	c 1-c4	d 1-d3
HUM153	Islamic Culture	1	-	1	-			a 1-a2	b 1-b3	c 1-c3	d 1-d3
HUM154	Scientific Thinking	1	-	1	-			a 1-a2	b 1-b2	c 1	d 1-d3
Total		8									

Specialization requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
Level 2											
IS211	File Organization	3	CS241	3	**2** H^T			a1- a9	b1-b4	c1-c6	d1-d6
MATH201	Mathematics III	3	MATH102	3	**2** H^T	2		a1-a3	b1-b5	c 1-c4	d 1-d4
EE201	Digital Signal Processing	3	MATH201	3	**2** H^T			a1-a3	b1-b5	c1-c4	d1-d4
Subtotal		0-9									

Specialization requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
Level 3											
CS301	Operation Research	3	CS201	3	**2** H^T			a1-a3	b1-b2	c 1-c3	
CS302	Simulation and Modeling	3	MATH202	3	**2** H^T			a1-a4	b1-b2	c1-c2	d1-d3
CS341	Visual Programming	3	CS211	3	**s2** H^T			a1-a6	b1-b5	c1-c5	d1-d6
CS351	Computer Graphics	3	IT101, CS201	3	**2** H^T			a1-a7	b1-b6	c1-c4	d1-d8
IS321	Advanced Project Management	3	IS221	3				a1- a2	b1	c1	d1
MM301	Introduction to Multimedia Technology	3	CS241	3	**2 HT**			a1- a3	b1-b6	c1- c7	d1-d7
MATH301	Numerical Analysis	3	MATH102	3		2		a1-a3	b1-b6	c 1-c7	d 1-d7
Subtotal		21-24									

Specialization requirements											
Code/ course No.	Course Title	Credits	Prerequisites	No. of hours /week			Semester	Achieved ILOs			
				Lec.	Practical.	tutorial		a's	b's	c's	d's
Level 4											
IS411	Advanced Database	3	IS212	**3**	**2** H^{O}			a1- a3	b1- b4	c1- c2	d1- d6
IS413	Web Information Systems	3	IS201, IT371	**3**	**2** H^{T}			a1- a4	b1- b5	c1- c6	d1- d8
IS414	Data Mining and Business Intelligence	3	IS201	**3**	**2** H^{T}			a1- a4	b1- b5	c1- c2	d1- d8
IS415	Database Administration	3	IS212	**3**	**2** H^{O}			a1- a2	b1- b3	c1- c4	d1- d7
IS416	Transaction Processing	3	IS212	**3**	**2** H^{O}			a1- a9	b1- b4	c1- c6	d1- d6
IS417	Multimedia Databases	3	IS212, CS241	**3**	**2** H^{O}			a1- a2	b1- b4	c1- c6	d1- d6
IS441	Quality Assurance of Information Systems	3	IS201	**3**	**2** H^{O}			a1- a9	b1- b13	c1- c6	d1- d12
IS442	IS Application Development	3	IS212, IS413	**3**	**2** H^{O}			a1- a9	b1- b10	c1- c6	d1- d12
IS451	Social Information Systems	3	IS413	**3**	**2** H^{O}			a1- a2	b1- b3	c1- c3	d1- d7
IT471	E-commerce	3	IT371	**3**	**2** H^{O}			a1- a6	b1- b2	c1- c3	d1- d7
MM412	Human Computer Interaction	3	CS341	**3**	**2** H^{T}			a1- a8	b1- b8	c1- d8	d1- d12
Subtotal		21-24									

7. Contents of Courses

Syllabus: See below

8. Program Admission Requirements

High score in secondary school education certificate in (mathematic section)

9. Regulations for progression and program completion

Please, refer to faculty bylaw (curriculum of undergraduate programs with credit hours), 2011.

10. Student Assessment (Methods and rules for student assessment)

Method (tool)	Intended leaning outcomes assessed
1- Written examinations	Knowledge and Understanding - Intellectual Skills - Professional Skills - General Skills
2- Oral examination	Knowledge and Understanding - Intellectual Skills
3- Laboratory examination	Professional Skills - General Skills
4- Graduation project	Professional Skills - General Skills
5- Reports and homework	Knowledge and Understanding

11. Program Evaluation

Evaluator	Tool	Sample
1- Senior students	Questionnaires	
2- Alumni	Questionnaires	
3- Stakeholders	Questionnaires,	
4-External Evaluator(s) (External Examiner(s))	Review Reports	

IS Program Matrices

IS Program Matrices

The main description of Information Systems Program can be summarized in different types of matrices. These matrices are:

1. **Academic Standards Matrix**
   This matrix shows the ILOs invoked in IS Program Specifications and those existing in NARS and the corresponding between them.
2. **Program Matrix I (Courses – NARS General)**
   This matrix shows how IS Program Courses can cover the NARS general ILOs.
3. **Program Matrix II (Courses – NARS Special)**
   This matrix shows how IS Program Courses can cover the NARS special ILOs.
4. **Program Matrix II (Courses – IS Program)**
   This matrix shows how IS Program Courses can cover IS Program ILOs.
5. **Program Matrix III (Courses – Knowledge and Understanding Skills)**
   This matrix shows how IS Program Courses can cover Knowledge and Understanding Skills invoked in IS Program Specifications.
6. **Program Matrix IV (Courses – Intellectual Skills)**
   This matrix shows how IS Program Courses can cover Intellectual Skills invoked in IS Program Specifications.
7. **Program Matrix V (Courses – Professional and Practical Skills)**
   This matrix shows how IS Program Courses can cover Professional and Practical Skills invoked in IS Program Specifications.
8. **Program Matrix VI (Courses – Transferable Skills)**
   This matrix shows how IS Program Courses can cover Transferable Skills invoked in IS Program Specifications.
9. **Program Matrix VII (Aims – ILOs)**
   This matrix shows how IS Program ILOs can cover the program aims.
10. **Teaching and Learning Methods Matrix VIII (ILOs-Teaching and Learning Methods)**
    This matrix shows what teaching methods are covered by IS Program ILOs.
11. **Assessment Methods Matrix VIIII (ILOs-Assessment Methods)**
    This matrix shows what assessment methods are covered by IS Program ILOs

Academic Standards (Knowledge and Understanding Skills)(October 2010)

IS Program ILOs	Corresponding in NARS		NARS ILOs - General	NARS ILOs - Special
a1. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics.	K1	A1	K1.Essential facts, concepts, principles and theories relating to computing and information and computer applications as appropriate to the program of study. K2. Modeling and design of computer-based systems bearing in mind the trade-offs. K3.Tools, practices and methodologies used in the specification, design, K4.Implementation and evaluation of computer software systems. K5.Criteria and specifications appropriate to specific problems, and plan strategies for their solution. K6. Criteria and specifications appropriate to specific problems, and plan strategies for their solution. K7. Principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results. K8.Management and economics principles relevant to computing and information disciplines. Professional, moral and ethical issues involved in the exploitation of K9.computer technology and be guided by the appropriate professional, K10.Ethical and legal practices relevant to the computing and information industry. K11.Requirements, practical constraints and computer-based systems	A1. A core of analysis, algebra, applied mathematics and statistics. A2. Information systems, data and Information Management, enterprise architecture, IS project management, IT infrastructure, systems analysis and design, and IS strategies. A3. Principles and techniques of database management systems, management, data mining, geographical information systems, multimedia, application development, business process management, enterprise systems, human- computer interaction, object-oriented analysis and design, e-technologies, multimedia, image processing, information and infrastructures security and computer graphics techniques. A4. Issues such as quality, reliability, enterprise, employment law, accounting and health. A5. Awareness of organizational, human and economic sides of modern organizations. A6. Principles of Information communication and information security. A7. Specification, analysis, design, implementation and operation and maintenance of IS solutions. A8. Modeling organizational processes and data, defining and implementing technical and process solutions, managing projects, and
a2. Demonstrate strong knowledge of information systems, data and Information management, enterprise architecture, IS project management, IT infrastructure, systems analysis and design, and IS Strategies.	K1	A2		
a3. Demonstrate strong skills of database management systems.	K2	A3		
a4. Know and understand the principles and techniques of a number of application areas informed by the research directions of information systems.	K2	A3		
a5. Show a critical understanding of the broad context within which information systems including issues such as quality and reliability.	K5	A4		
a6. Show a critical understanding within information systems applications, such as accounting, health informatics, medical informatics, etc.	K3	A3		
a7. Have a comprehensive knowledge and critical awareness of selected specialist fields at the forefront of information systems.	K8	A3		
a8. Show a critical understanding of the principles of Information communication and information security.	K4	A6		
a9. Show a critical understanding of the challenges inherent in the maintenance and evolution of software systems, and the techniques and best practices currently available for dealing with them.	K7	A3		
a10. Provide a deeper understanding of some aspects of object-oriented analysis and design.	K9	A3		
a11. Provide a deeper understanding of decision support tools and systems.	K5	A9		
a12. Show an understanding of various approaches to Management Sciences (MS) such as Operation Management, Inventory Management, Project Management, and Supply Chain Management.	K6	A2, A5		
a13. Interpreting and analyzing data qualitatively and/or quantitatively.	K11	A8		
a14. Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems, data structures and algorithms, software engineering techniques and information retrieval.	K5	A3		
a15. Demonstrate a deep knowledge of business area analysis and the enterprise architecture.	K10	A8		
a16. Knowledge of the tools, practices and methodologies used in the specification, design, implementation and critical evaluation of	K2	A7		

IS Program ILOs	Corresponding in NARS		NARS ILOs - General	NARS ILOs - Special
information systems.				integrating systems A9. Types and alternatives of global information systems architectures, and their differences in terms of service and cost consequences, and their implications for the organizational support needed.
a17. Knowledge of the methods used in defining and assessing criteria for measuring the extent to which an information system is appropriate for its current deployment and future evolution.	K3	A8		
a18. Knowledge and understanding of the current and underlying technologies that support computer processing and inter-computer communication.	K4	A6		
a19. Knowledge of developments in research fields across a range of knowledge areas	K8	A3		

Academic Standards (Intellectual Skills)

IS Program ILOs	Corresponding in NARS		NARS ILOs - General	NARS ILOs - Special
b1. Define traditional and nontraditional information systems problems, set goals towards solving them, and observe results.	I2	B1	I1.Analyze computing problems and provide solutions related to the design and construction of computing systems. I2.Realize the concepts, principles, theories and practices behind computing and information as an academic discipline. I3.Identify criteria to measure and interpret the appropriateness of a computer system for its current deployment and future evolution. I4.Analyze, propose and evaluate alternative computer systems and processes taking into account limitations, and quality constraints. I5.Make ideas, proposals and designs using rational and reasoned arguments for presentation of computing systems. I6.Evaluate the results of tests to investigate the functionality of computer systems. I7.Achieve judgments considering balanced costs, benefits, safety, quality, reliability, and environmental impact. I8.Familiar with the professional, legal, moral and ethical issues relevant to the computing industry. I9.Evaluate research papers in a range of knowledge areas	B1. Define traditional and nontraditional information systems problems, set goals towards solving them, and. observe results. B2. Perform comparisons between (methods, techniques...etc). B3. Identify attributes, components, relationships, patterns, main ideas, and errors. B4. Restrict solution methodologies upon their results. B5. Select the suitable tools, methods and techniques for modeling, analyzing IS, establishing criteria, and verify solutions. B6. Identify a range of solutions and critically evaluate and justify proposed design solutions. B7. Solve IS problems with pressing commercial, time, and industrial constraints. B8. Suggest an innovative design to solve a problem containing a range of commercial and industrial constraints. B9. Perform problem analysis from written descriptions; derive requirements specifications from an understanding of problems (analysis, synthesis).
b2. Perform comparisons between (methods, techniques...etc).	I3	B2		
b3. Identify attributes, components, relationships, patterns, main ideas, and errors.	I2	B3		
b4. Summarize the proposed solutions ad their results.	I4	B4		
b5. Restrict solution methodologies upon their results.	I5	B4		
b6. Establish criteria, and verify solutions.	I4	B5		
b7. Identify a range of solutions and critically evaluate and justify proposed design solutions.	I5	B7		
b8. Solve information systems problems with pressing commercial or industrial constraints.	I5	B8		
b9. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.	I6	B9		
b10. Perform problem analysis from written descriptions;	I6	B9		
b11. Derive requirements specifications from an understanding of problems (analysis, synthesis).	I6	B9		
b12. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application).	I6, I7	B9		
b13. Solve a decision model with appropriate techniques.	I8	B8		
b14. Solve complex problems within and between enterprises.	I1	B8		
b15. Perform improvement of a system that benefits stakeholders.	I9	B6		
b16. Recognize the professional, moral and ethical issues involved in the exploitation of Information Technology and be guided by their adoption, reflect on issues of professional practice within the discipline.	I9	-		
b17. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline.	I2			
b18. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences.	I4	B7		
b19. Generate and evaluate the results of tests to investigate the functionality of information systems.	I7	B7		

Academic Standards (Professional and Practical Skills)

IS Program ILOs	Corresponding in NARS		NARS ILOs - General	NARS ILOs – Special
c1. Use appropriate programming languages.	P2	C1	P1.Operate computing equipment, recognizing its logical and physical properties, capabilities and limitations. P2.Implement comprehensive computing knowledge and skills in projects and in deployment of computers to solve position practical problems. P3.Deploy the equipment and tools used for the construction, maintenance and documentation of computer applications. P4.Apply computing information retrieval skills in computing community environment and industry. P5.Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material. P6.Design, implement, maintain, and manage software systems. P7.Assess the implications, risks or safety aspects involved in the operation of computing equipment within a specific context. P8.Handle a mass of diverse data, assess risk and draw conclusions.	C1. Use appropriate programming languages, web-based systems and tools, design methodologies, and database systems. C2. Use quantitative analysis techniques appropriately. C3. Justify technological, methodological and management choices for an information system project for a given organization. C4. Plan and manage an information systems project from inception to final implementation cut-over. C5. Produce acceptable reports and technical and user system documentation. C6. Perform information acquisition and management, using the scientific literature and web sources. C7. Apply the principles of effective information acquisition, information management, organization, and information-retrieval to text, images, sound, and video. 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. C9. Using tools to automate IS development phases. C10. Analyze and documenting the feasibility of various options and comparing solution concepts. C11. Maintaining existing information systems.
c2. Use appropriate web-based systems and tools, and design methodologies.	P2	C1		
c3. Use appropriate database management systems.	P2	C1		
c4. Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video.	P3	C2, C4, C6, C7		
c5. 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.	P3	C8		
c6. Identify any risks or safety aspects that may be involved within a given context.	P7	C3, C9		
c7. 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.	P5	C5, C10		
c8. Implement data and model centered systems.	P8	C2, C10		
c9. Operate computing equipment effectively, recognizing its logical and physical properties, capabilities and limitations.	P1	C10, C11		
c10. Commercialize knowledge and skills to computing community and industry	P7	C6, C11		

Academic Standards (Transferable Skills)

IS Program ILOs	Corresponding in NARS		NARS ILOs - General	NARS ILOs - Special
d1. Collaborate effectively within multidisciplinary team.	T2, P4		T1.Demonstrate the ability to make use of a range of learning resources and to manage one's own learning. T2.Demonstrate skills in group working, team management, time management and organizational skills. T3.Show the use of information-retrieval. 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. T5.Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension. 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. T7.Show the use of general computing facilities. T8.Demonstrate an appreciation of the need to continue professional development in recognition of the requirement for life-long learning.	–
d2. Work in stressful environment and within constraints.	T3			
d3. Communicate effectively using a variety of communication methods.	T6			
d4. Communicate effectively with team members, managers and customers.	T7			
d5. Demonstrate efficient IT capabilities.	T2			
d6. Lead and motivate individuals.	T4			
d7. Manage tasks and resources.	T9			
d8. Search for information and adopt life-long self-learning.				
d9. Acquire entrepreneurial skills.				
d10. Acquire analytical thinking and problem solving skills				
d11. Effectively employ information-retrieval skills, (including the use of browsers, search engines, and on-line library catalogues).	T3			
d12. Ability to work independently and as part of a team with minimum guidance.	P4			
d13. Manage one's own learning and development, including time management and organizational skills.	T1			
d14. Prepare their work in the form of reports, oral presentations or an internet web site.				
d15. Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension.	T5			
d16. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material	T8			

Academic Standards Matrix

Knowledge and Understanding Skills			
NARS ILOs General	Covering ILOs in IS Program	NARS ILOs Special	Covering ILOs in IS Program
K1	a1, a2, a3, a10	**A1**	a1
K2	a4, a5, a16	**A2**	a2, a12
K3	a6, a7, a17	**A3**	a3,a4,a6,a7,a9,a10,a14,a19
K4	a8, a18	**A4**	a5
K5	a11, a14	**A5**	a12
K6	a12	**A6**	a8,a18
K7	a9	**A7**	a16
K8	a13, a15, a19	**A8**	a13,a15,a17
		A9	a11

Intellectual Skills			
NARS ILOs General	Covering ILOs in IS Program	NARS ILOs Special	Covering ILOs in IS Program
I1	b14	**B1**	b1
I2	b1, b17	**B2**	b2
I3	b2, b3	**B3**	b3
I4	b4, b6	**B4**	b4,b5
I5	b5, b7, b8	**B5**	b6
I6	b9, b10, b11, b12, b18	**B6**	b15
I7	b12, b19	**B7**	b7,b18,b19
I8	b13	**B8**	b8, b13,b14
I9	b16	**B9**	b9,b11,b12
I10	b15		

Professional and Practical Skills			
NARS ILOs General	Covering ILOs in IS Program	NARS ILOs Special	Covering ILOs in IS Program
P1	c9	**C1**	c1, c2, c3
P2	c1, c2, c3	**C2**	c4,c8
P3	c5	**C3**	c6
P4	d1, d12	**C4**	c4
P5	c7	**C5**	c7
P6	c4	**C6**	c4,c10
P7	c6, c10	**C7**	c4
		C8	c5
		C9	c6
		C10	c8, c9
		C11	c9,c10

Transferable skills	
NARS ILOs General	Covering ILOs in IS Program
T1	d6, d13
T2	d5
T3	d11
T4	d2
T5	d15
T6	d3
T7	d4
T8	d16
T9	d7

IS Program Courses

	Course Code	Course Title		Course Code	Course Title
1st Level	CS141	Programming Fundamentals	3rd Level	CS322	Computer Architecture and Operating Systems
	IT101	IT Fundamentals		CS381	Software Development and Professional Practice
	MATH101	Mathematics I		CS382	Field Training
	MATH102	Mathematics I I		CS391	Software Engineering
	PHYS101	Physics I		IS311	Geographical Information Systems
	PHYS102	Physics II		IS341	Decision Support Systems
	EE101	Electronics		IS342	IS Strategy, Management and Acquisition
	EE102	Digital Circuits		IT351	Computer Networks
	HUM111	English Language I		IT371	Web Programming
	HUM121	Social Context of Computing	4th Level	IS452	Capstone Project I
	HUM132	Interpersonal Communication		IS453	Capstone Project II
2nd Level	CS201	Discrete Structures		IT411	Information Assurance and Security
	CS211	Data Structures and Algorithms		IT441	Enterprise Architecture
	CS241	Object-Oriented Programming		MM412	Human Computer Interaction
	IS201	Foundations of Information Systems			
	MATH202	Probability and Statistics			
	HUM231	Business Administration			

	Course Code	Course Title		Course Code	Course Title
	HUM232	Technical Writing			
	HUM241	Computers and Ethics			

	Elective Course			Elective Course	
	Course Code	Course Title		Course Code	Course Title
1st Level	HUM112	English Language II	**3rd Level**	CS301	Operation Research
	HUM122	Intellectual Property		CS302	Simulation and Modeling
	HUM131	Organizational Behavior		CS341	Visual Programming
	HUM133	Computing Economics		CS351	Computer Graphics
	HUM141	Computer Law		IS321	Advanced Project Management
	HUM142	Privacy and Civil Liberties		MM301	Introduction to Multimedia Technology
	HUM151	Hand Drawing		MATH301	Numerical Analysis
	HUM152	History of Computing	**4th Level**	IS411	Advanced Database
	HUM153	Islamic Culture		IS412	Distributed and Object Databases
	HUM154	Scientific Thinking		IS411	Advanced Database
2nd Level	IS211	File Organization		IS413	Web Information Systems
	IS212	Databases		IS414	Data Mining and Business Intelligence
	IS221	Project Management		IS415	Database Administration
	IS231	Systems Analysis and Design		IS416	Transaction Processing
	IT251	Data Communications		IS417	Multimedia Databases

	Elective Course			Elective Course	
	Course Code	Course Title		Course Code	Course Title
	EE201	Digital Signal Processing		IS441	Quality Assurance of Information Systems
				IS442	IS Application Development
				IS451	Social Information Systems
				IS452	Capstone Project I
				IS453	Capstone Project II
				IT411	Information Assurance and Security
				IT441	Enterprise Architecture
				IT471	E-commerce
				IS411	Advanced Database
				IS412	Distributed and Object Databases
				IS413	Web Information Systems
				IS414	Data Mining and Business Intelligence
				IS415	Database Administration
				IS416	Transaction Processing
				IS417	Multimedia Databases
				IS441	Quality Assurance of Information Systems
				IS442	IS Application Development
				IS451	Social Information Systems
				IT471	E-commerce

Program Matrix I (Courses – NARS General)

	Course	K1	K2	K3	K4	K5	K6	K7	K8	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	P1	P2	P3	P4	P5	P6	P7	T1	T2	T3	T4	T5	T6	T7	T8	T9
1st Level	CS141	✓	✓	✓							✓	✓	✓	✓							✓	✓	✓		✓		✓	✓		✓		✓	✓		
	IT101	✓	✓	✓	✓						✓	✓	✓								✓		✓		✓			✓		✓		✓	✓		
	MATH101	✓										✓	✓	✓							✓		✓					✓		✓		✓			
	MATH102	✓	✓									✓	✓	✓							✓		✓		✓			✓		✓		✓			
	PHYS101	✓	✓								✓	✓	✓	✓							✓	✓	✓		✓		✓	✓		✓		✓	✓		
	PHYS102	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓					✓					✓	✓	✓			✓			✓		✓
	EE101	✓										✓	✓	✓						✓			✓			✓	✓			✓			✓		✓
	EE102	✓										✓	✓	✓						✓	✓		✓	✓			✓			✓			✓		✓
	HUM111	✓									✓	✓									✓		✓				✓	✓		✓		✓	✓		✓
	HUM121	✓									✓	✓									✓		✓				✓	✓		✓		✓	✓		✓
	HUM132	✓									✓	✓									✓		✓				✓	✓		✓		✓	✓		✓
	HUM112	✓									✓	✓									✓		✓				✓	✓		✓		✓	✓		✓
	HUM122	✓									✓	✓									✓		✓		✓		✓	✓		✓		✓	✓		✓
	HUM131	✓									✓	✓									✓		✓				✓	✓		✓		✓	✓		✓
	HUM133	✓	✓	✓							✓	✓									✓		✓		✓		✓	✓		✓		✓	✓		✓
	HUM141	✓	✓								✓	✓	✓	✓							✓		✓				✓	✓		✓		✓	✓		✓
	HUM142	✓	✓								✓	✓	✓	✓							✓		✓					✓		✓		✓			
	HUM151	✓	✓								✓	✓	✓								✓		✓					✓		✓		✓			
	HUM152	✓	✓	✓	✓			✓			✓	✓									✓		✓		✓			✓		✓		✓			
	HUM153	✓									✓	✓									✓		✓					✓		✓		✓			
	HUM154	✓									✓	✓									✓		✓					✓		✓		✓			
2nd Level	CS201	✓									✓	✓	✓	✓							✓		✓		✓			✓		✓		✓	✓		
	CS211	✓	✓								✓	✓	✓	✓	✓						✓	✓	✓	✓	✓	✓		✓		✓		✓	✓		
	CS241	✓	✓								✓	✓	✓	✓							✓	✓	✓	✓	✓	✓		✓		✓		✓	✓		
	IS201	✓	✓	✓							✓	✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓		✓
	MATH202	✓	✓								✓	✓	✓	✓							✓		✓		✓			✓		✓		✓			
	HUM231	✓									✓	✓									✓		✓				✓	✓		✓		✓	✓		✓
	HUM232	✓	✓								✓	✓									✓		✓				✓	✓		✓		✓	✓		✓
	HUM241	✓									✓										✓		✓				✓	✓		✓		✓	✓		✓
	IS211	✓	✓	✓	✓			✓			✓	✓	✓								✓	✓	✓		✓	✓	✓	✓		✓		✓	✓		
	IS212	✓	✓	✓	✓						✓	✓	✓								✓	✓	✓		✓	✓	✓	✓		✓		✓	✓		✓
	IS221	✓									✓	✓									✓		✓				✓	✓		✓		✓	✓		
	IS231	✓	✓							✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓		✓		✓	✓		✓		✓	✓		
	IT251	✓	✓	✓							✓	✓	✓								✓	✓	✓		✓		✓	✓		✓		✓	✓		
	EE201	✓									✓	✓	✓	✓							✓		✓		✓			✓		✓		✓	✓		
3rd Level	CS322		✓	✓	✓	✓			✓		✓	✓			✓						✓	✓	✓	✓	✓	✓	✓			✓				✓	
	CS381	✓	✓	✓	✓			✓			✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓		✓		✓	✓		
	CS382	✓	✓	✓	✓						✓	✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓		
	CS391	✓	✓	✓	✓			✓			✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓		✓		✓	✓		
	IS311	✓	✓								✓	✓	✓	✓							✓	✓	✓		✓		✓	✓		✓		✓	✓		
	IS341	✓	✓	✓	✓						✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓		✓
	IS342	✓	✓	✓	✓						✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓		
	IT351	✓	✓	✓							✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓		✓
	IT371	✓	✓	✓	✓						✓	✓									✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓		✓
	CS301	✓									✓	✓									✓														
	CS302	✓	✓								✓	✓									✓	✓	✓					✓		✓		✓			
	CS341	✓	✓	✓							✓	✓	✓	✓							✓	✓	✓		✓		✓	✓		✓		✓	✓		
	CS351	✓	✓	✓							✓	✓	✓	✓							✓		✓		✓		✓	✓		✓		✓	✓		✓
	IS321	✓									✓										✓		✓					✓							
	MM301	✓									✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓		✓
	MATH301	✓									✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓		✓

4th Level	IS452	✓	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓						✓	✓	✓		✓	✓		✓	✓	✓		✓
	IS453	✓	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓						✓	✓	✓		✓	✓		✓	✓	✓		✓
	IT441	✓	✓	✓							✓	✓	✓	✓							✓	✓	✓		✓	✓		✓	✓	✓		
	MM412																															
	IS411	✓									✓	✓	✓								✓		✓				✓	✓	✓	✓		
	IS412	✓	✓								✓	✓	✓	✓							✓		✓				✓	✓	✓	✓		
	IS413	✓	✓								✓	✓	✓	✓							✓	✓	✓		✓	✓	✓	✓	✓	✓		✓
	IS414	✓	✓								✓	✓	✓	✓							✓		✓				✓	✓	✓	✓		✓
	IS415	✓									✓	✓									✓		✓		✓		✓	✓	✓	✓		✓
	IS416	✓	✓	✓	✓			✓			✓	✓									✓	✓	✓		✓	✓	✓	✓	✓	✓		
	IS417	✓									✓	✓	✓								✓	✓	✓		✓	✓	✓	✓	✓	✓		
	IS441	✓	✓	✓	✓			✓			✓	✓	✓	✓	✓		✓	✓			✓	✓	✓			✓	✓	✓	✓	✓		✓	
	IS442	✓	✓	✓	✓			✓			✓	✓	✓	✓	✓						✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
	IS451	✓									✓	✓									✓		✓				✓	✓	✓	✓		
	IT411	✓	✓	✓	✓						✓	✓	✓	✓							✓		✓		✓		✓	✓	✓	✓		
	IT471	✓	✓	✓							✓	✓									✓		✓				✓	✓	✓	✓		

Program Matrix II (Courses – NARS Special)

	Course	A1	A2	A3	A4	A5	A6	A7	A8	A9	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
1st Level	CS141	✓	✓	✓	✓		✓				✓	✓	✓	✓						✓										
	IT101						✓						✓												✓					✓
	MATH101	✓	✓									✓	✓	✓	✓					✓										
	MATH102	✓	✓	✓	✓						✓	✓	✓	✓	✓					✓	✓		✓		✓	✓				
	PHYS101	✓	✓	✓	✓						✓	✓	✓	✓						✓	✓		✓		✓	✓				
	PHYS102	✓							✓				✓				✓				✓	✓	✓		✓	✓		✓	✓	✓
	EE101	✓										✓		✓	✓		✓					✓						✓	✓	✓
	EE102	✓										✓		✓	✓		✓					✓						✓	✓	
	HUM111	✓									✓	✓								✓										
	HUM121	✓	✓	✓							✓	✓	✓							✓										
	HUM132	✓	✓	✓							✓	✓	✓							✓										
	HUM112	✓	✓								✓	✓	✓							✓										
	HUM122	✓	✓								✓	✓	✓							✓										
	HUM131	✓	✓								✓	✓	✓							✓										
	HUM133	✓	✓	✓	✓						✓									✓										
	HUM141	✓	✓	✓	✓						✓	✓	✓	✓						✓										
	HUM142	✓	✓	✓							✓	✓	✓	✓						✓										
	HUM151	✓	✓	✓							✓	✓	✓	✓						✓										
	HUM152	✓	✓	✓	✓		✓				✓	✓	✓							✓	✓		✓		✓	✓				
	HUM153	✓	✓								✓	✓	✓							✓										
	HUM154	✓	✓								✓	✓								✓										
2nd Level	CS201	✓	✓								✓	✓	✓	✓	✓					✓	✓		✓		✓	✓				
	CS211	✓	✓	✓	✓						✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	CS241	✓	✓	✓	✓						✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓	✓	✓		
	IS201	✓	✓	✓	✓						✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MATH202	✓	✓	✓	✓						✓	✓	✓	✓	✓					✓	✓		✓		✓	✓				
	HUM231	✓	✓								✓	✓	✓							✓										
	HUM232	✓	✓	✓							✓	✓	✓							✓										
	HUM241	✓	✓								✓	✓	✓							✓										
	IS211	✓	✓	✓	✓		✓				✓	✓	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓		
	IS212	✓	✓	✓	✓		✓				✓	✓	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓		
	IS221	✓	✓								✓	✓								✓										
	IS231	✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓			
	IT251	✓	✓	✓	✓						✓	✓	✓	✓						✓	✓		✓		✓	✓	✓			
	EE201	✓	✓	✓							✓	✓	✓	✓						✓	✓		✓		✓	✓				
3rd Level	CS322			✓								✓					✓			✓				✓						
	CS381	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
	CS382	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	CS391		✓	✓	✓		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
	IS311	✓	✓	✓	✓						✓	✓	✓	✓						✓	✓		✓		✓	✓	✓			
	IS341	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		
	IS342	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		
	IT351	✓	✓	✓	✓						✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓	✓	✓		
	IT371	✓	✓	✓	✓		✓				✓	✓	✓							✓	✓	✓	✓		✓	✓	✓	✓		
	CS301	✓	✓	✓							✓	✓								✓										
	CS302	✓	✓	✓							✓	✓								✓										
	CS341	✓	✓	✓	✓						✓	✓	✓	✓						✓	✓		✓		✓	✓	✓			
	CS351	✓	✓	✓	✓						✓	✓	✓	✓	✓					✓	✓		✓		✓	✓				
	IS321	✓	✓								✓									✓										
	MM301	✓	✓	✓							✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓		
	MATH301	✓	✓	✓							✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓		
Le	IS452	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		

	IS453	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
	IT411	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓					✓	✓		✓		✓	✓			
	IT441	✓	✓	✓	✓						✓	✓	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓	
	MM412																												
	IS411	✓	✓	✓							✓	✓	✓	✓						✓									
	IS412	✓	✓	✓							✓	✓	✓	✓	✓					✓									
	IS411	✓	✓	✓							✓	✓	✓	✓						✓									
	IS413	✓	✓	✓							✓	✓	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓	
	IS414	✓	✓	✓							✓	✓	✓	✓						✓									
	IS415	✓	✓								✓	✓	✓							✓	✓		✓		✓	✓			
	IS416	✓	✓	✓	✓		✓				✓	✓	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓	
	IS417	✓	✓								✓	✓	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓	
	IS441	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
	IS442	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
	IS451	✓	✓								✓	✓	✓							✓									
	IS452	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
	IS453	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
	IT411	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓					✓	✓		✓		✓	✓			
	IT441	✓	✓	✓	✓						✓	✓	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓	
	IT471	✓	✓	✓	✓						✓	✓								✓									
	IS411	✓	✓	✓							✓	✓	✓	✓						✓									
	IS412	✓	✓	✓							✓	✓	✓	✓	✓					✓									
	IS413	✓	✓	✓							✓	✓	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓	
	IS414	✓	✓	✓							✓	✓	✓	✓						✓									
	IS415	✓	✓								✓	✓	✓							✓	✓		✓		✓	✓			
	IS416	✓	✓	✓	✓		✓				✓	✓	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓	
	IS417	✓	✓								✓	✓	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓	
	IS441	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
	IS442	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
	IS451	✓	✓								✓	✓	✓							✓									
	IT471	✓	✓	✓	✓						✓	✓								✓									
		A1	A2	A3	A4	A5	A6	A7	A8	A9	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10

Program Matrix (Courses – IS Programs)

	Course	a1	a2	a3	a4	a5	a6	a7	a 8	a 9	a 10	a 11	a 12	a 13	a 14	a 15	a 16	a 17	a 18	a 19	
1st Level	CS141	✓	✓	✓	✓	✓															
	IT101	✓	✓	✓																	
	MATH101	✓	✓	✓	✓	✓	✓														
	MATH102	✓	✓	✓	✓	✓	✓														
	PHYS101	✓	✓	✓	✓																
	PHYS102	✓	✓	✓	✓																
	EE101	✓	✓	✓	✓	✓	✓														
	EE102	✓	✓	✓	✓	✓	✓														
	HUM111	✓	✓																		
	HUM121	✓	✓	✓	✓	✓	✓	✓	✓	✓											
	HUM132	✓	✓	✓	✓	✓	✓	✓	✓	✓											
	HUM112	✓	✓	✓	✓	✓	✓	✓													
	HUM122	✓	✓	✓	✓	✓	✓	✓													
	HUM131	✓	✓	✓	✓	✓	✓	✓													
	HUM133	✓	✓	✓	✓	✓	✓	✓													
	HUM141	✓	✓	✓	✓																
	HUM142	✓	✓	✓																	
	HUM151	✓	✓	✓																	
	HUM152	✓	✓	✓																	
	HUM153		✓	✓																	
	HUM154	✓	✓	✓																	
2nd Level	CS201	✓	✓	✓	✓																
	CS211	✓	✓	✓	✓	✓	✓														
	CS241	✓	✓	✓	✓	✓	✓														
	IS201		✓	✓	✓			✓	✓				✓		✓		✓	✓		✓	
	MATH202	✓												✓		✓			✓		
	HUM231	✓	✓	✓	✓	✓	✓														
	HUM232	✓	✓		✓	✓	✓														
	HUM241	✓	✓	✓		✓	✓														
	IS211		✓				✓	✓				✓			✓	✓			✓	✓	
	IS212		✓	✓	✓	✓		✓		✓			✓		✓	✓			✓		
	IS221		✓			✓		✓							✓			✓			
	IS231	✓	✓		✓		✓			✓	✓		✓		✓			✓		✓	
	IT251	✓	✓	✓	✓	✓	✓														
	EE201	✓	✓	✓	✓																
3rd Level	CS322	✓	✓	✓	✓		✓														
	CS381	✓	✓	✓	✓	✓	✓														
	CS382	✓	✓	✓	✓	✓															
	CS391	✓	✓	✓	✓	✓	✓														
	IS311		✓	✓				✓		✓			✓	✓			✓		✓		
	IS341		✓			✓	✓					✓	✓		✓			✓	✓		
	IS342	✓		✓	✓				✓			✓		✓	✓			✓			
	IT351	✓	✓	✓	✓	✓	✓	✓	✓	✓											
	IT371	✓	✓	✓	✓	✓	✓	✓													
	CS301	✓	✓	✓		✓															
	CS302	✓	✓	✓		✓															
	CS341	✓	✓	✓	✓	✓	✓														
	CS351	✓	✓	✓	✓	✓	✓														
	IS321	✓	✓	✓	✓	✓	✓														

	MM301	✓	✓	✓	✓	✓	✓														
	MATH301	✓											✓		✓			✓			
4th Level	IS452	✓	✓	✓	✓	✓		✓		✓	✓		✓		✓	✓		✓		✓	
	IS453	✓	✓	✓	✓	✓		✓		✓	✓		✓		✓	✓		✓		✓	
	IT411	✓	✓	✓	✓																
	IT441	✓	✓	✓	✓	✓															
	MM412				✓				✓	✓			✓			✓	✓	✓	✓	✓	
	IS411		✓	✓	✓	✓		✓		✓			✓		✓	✓			✓		
	IS412		✓	✓	✓	✓		✓		✓			✓		✓	✓			✓		
	IS413		✓		✓	✓	✓		✓			✓		✓			✓	✓		✓	
	IS414	✓		✓	✓			✓	✓		✓	✓		✓		✓	✓		✓	✓	
	IS415	✓		✓	✓	✓							✓		✓		✓			✓	
	IS416		✓		✓	✓	✓		✓			✓		✓			✓	✓		✓	
	IS417		✓	✓	✓	✓		✓		✓			✓		✓	✓			✓		
	IS441	✓	✓	✓	✓		✓			✓	✓			✓	✓		✓		✓		
	IS442	✓	✓		✓	✓	✓			✓	✓			✓	✓		✓		✓		
	IS451					✓				✓										✓	
	IS452	✓	✓	✓	✓	✓		✓		✓	✓		✓		✓	✓		✓		✓	
	IS453	✓	✓	✓	✓	✓		✓		✓	✓		✓		✓	✓		✓		✓	
	IT411	✓	✓	✓	✓																
	IT441	✓	✓	✓	✓	✓															
	IT471				✓				✓	✓			✓			✓	✓	✓	✓	✓	
	IS411		✓	✓	✓	✓		✓		✓			✓		✓	✓			✓		
	IS412		✓	✓	✓	✓		✓		✓			✓		✓	✓			✓		
	IS413		✓		✓	✓	✓		✓			✓		✓			✓	✓		✓	
	IS414	✓		✓	✓			✓	✓		✓	✓		✓		✓	✓		✓	✓	
	IS415	✓		✓	✓	✓							✓		✓		✓			✓	
	IS416		✓		✓	✓	✓		✓			✓		✓			✓	✓		✓	
	IS417		✓	✓	✓	✓		✓		✓			✓		✓	✓			✓		
	IS441	✓	✓	✓	✓		✓			✓	✓			✓	✓		✓		✓		
	IS442	✓	✓		✓	✓	✓			✓	✓			✓	✓		✓		✓		
	IS451	✓		✓	✓	✓							✓		✓		✓			✓	
	IT471		✓		✓	✓	✓		✓			✓		✓			✓	✓		✓	
		a1	a2	a3	a4	a5	a6	a7	a 8	a 9	a 10	a 11	a 12	a 13	a 14	a 15	a 16	a 17	a 18	a 19	

	Course	b1	b2	b3	b4	b5	b6	b7	b 8	b9	b 10	b 11	b 12	b 13	b 14	b 15	b 16	b 17	b 18	b 19	
1st Level	CS141																				
	IT101	✓	✓	✓																	
	MATH101	✓	✓	✓	✓	✓															
	MATH102	✓	✓	✓	✓	✓															
	PHYS101	✓	✓	✓	✓																
	PHYS102	✓	✓	✓	✓																
	EE101	✓	✓	✓	✓	✓		✓													
	EE102	✓	✓	✓	✓	✓	✓														
	HUM111																				
	HUM121	✓	✓	✓																	
	HUM132																				
	HUM112	✓	✓	✓																	
	HUM122	✓	✓																		
	HUM131																				
	HUM133	✓	✓	✓	✓	✓															✓
	HUM141	✓	✓	✓	✓																
	HUM142	✓	✓	✓	✓																
	HUM151	✓			✓																✓
	HUM152	✓	✓	✓																	
	HUM153		✓	✓																	✓
	HUM154	✓	✓																		
2nd Level	CS201	✓	✓	✓	✓	✓															
	CS211	✓	✓	✓	✓																
	CS241	✓	✓	✓	✓																
	IS201	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓
	MATH202		✓	✓	✓	✓	✓	✓													
	HUM231			✓																	
	HUM232			✓																	
	HUM241			✓																	
	IS211		✓	✓					✓												
	IS212			✓				✓					✓							✓	
	IS221	✓																			✓
	IS231			✓	✓	✓							✓						✓		
	IT251																				
	EE201		✓	✓	✓	✓	✓														
3rd Level	CS322	✓	✓	✓	✓	✓												✓			
	CS381	✓	✓	✓	✓	✓	✓														
	CS382	✓	✓	✓	✓																
	CS391	✓	✓		✓	✓															
	IS311	✓	✓			✓	✓														✓
	IS341		✓		✓	✓	✓	✓			✓										
	IS342		✓		✓	✓			✓												
	IT351		✓	✓	✓	✓	✓														
	IT371	✓	✓	✓	✓	✓												✓			
	CS301	✓	✓	✓	✓	✓	✓														
	CS302	✓	✓	✓	✓																
	CS341	✓	✓		✓	✓															
	CS351	✓	✓			✓	✓														✓
	IS321	✓	✓	✓	✓	✓	✓														
	MM301	✓	✓	✓	✓																
	MATH301	✓	✓	✓	✓	✓															✓

4th Level																					
	IS452							✓		✓											
	IS453							✓		✓											
	IT411						✓	✓		✓	✓										
	IT441		✓	✓	✓	✓	✓	✓													
	MM412																				
	IS411		✓	✓				✓													
	IS412		✓	✓	✓	✓	✓	✓													
	IS413	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓
	IS414	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓
	IS415			✓		✓	✓	✓	✓	✓	✓										
	IS416	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								✓
	IS417	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								✓
	IS441	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	IS442			✓		✓	✓	✓	✓	✓	✓										
	IS451	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	IS452	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	IS453	✓	✓	✓	✓																
	IT411		✓		✓	✓															
	IT441	✓	✓			✓	✓														✓
	IT471		✓		✓	✓	✓	✓			✓										
	IS411		✓		✓	✓			✓												
	IS412		✓	✓	✓	✓	✓														
	IS413	✓	✓	✓	✓	✓													✓		
	IS414	✓	✓	✓	✓																
	IS415		✓		✓	✓															
	IS416	✓	✓			✓	✓														✓
	IS417		✓		✓	✓	✓	✓			✓										
	IS441		✓		✓	✓			✓												
	IS442		✓	✓	✓	✓	✓														
	IS451	✓	✓	✓	✓	✓													✓		
	IT471		✓	✓	✓	✓	✓														
		b1	b2	b3	b4	b5	b6	b7	b 8	b9	b 10	b 11	b 12	b 13	b 14	b 15	b 16	b 17	b 18	b 19	

	Course	c1	c2	c3	C4	C5	C6	C7	C8	c9	C10	
1st Level	CS141	✓	✓	✓	✓							
	IT101	✓	✓	✓	✓							
	MATH101	✓	✓	✓								
	MATH102	✓	✓	✓	✓							
	PHYS101	✓	✓	✓	✓	✓						
	PHYS102	✓	✓	✓	✓	✓						
	EE101	✓	✓	✓	✓	✓						
	EE102	✓	✓	✓	✓	✓						
	HUM111	✓	✓	✓								
	HUM121	✓	✓	✓								
	HUM132	✓	✓	✓								
	HUM112	✓		✓								
	HUM122	✓	✓	✓								
	HUM131	✓		✓								
	HUM133	✓	✓									
	HUM141	✓		✓								
	HUM142		✓	✓								
	HUM151	✓		✓								
	HUM152	✓	✓									
	HUM153	✓		✓			✓					
	HUM154	✓										
2nd Level	CS201	✓	✓	✓								
	CS211	✓		✓								
	CS241	✓	✓	✓								
	IS201	✓	✓	✓	✓	✓		✓		✓		
	MATH202	✓	✓	✓	✓	✓	✓		✓	✓		
	HUM231											
	HUM232											
	HUM241	✓	✓	✓	✓	✓						
	IS211	✓	✓	✓	✓	✓						
	IS212	✓	✓	✓			✓				✓	
	IS221	✓			✓		✓		✓		✓	
	IS231	✓	✓	✓	✓			✓	✓		✓	
	IT251	✓			✓							
	EE201	✓	✓	✓	✓	✓						
3rd Level	CS322	✓	✓	✓								
	CS381	✓			✓							
	CS382	✓	✓	✓	✓							
	CS391	✓	✓	✓	✓							
	IS311			✓	✓			✓		✓	✓	
	IS341	✓			✓	✓			✓		✓	
	IS342	✓		✓	✓				✓		✓	
	IT351	✓	✓	✓	✓							
	IT371	✓	✓		✓							
	CS301	✓	✓	✓								
	CS302	✓		✓	✓							
	CS341	✓	✓	✓	✓							
	CS351	✓	✓		✓							

	IS321	✓		✓	✓				✓		✓	
	MM301		✓	✓					✓		✓	
	MATH301	✓			✓				✓			
	IS452	✓	✓	✓	✓			✓		✓	✓	
	IS453	✓	✓	✓	✓			✓		✓	✓	
	IT411	✓	✓	✓	✓							
	IT441	✓	✓	✓	✓							
	MM412		✓	✓					✓		✓	
	IS411			✓		✓	✓		✓		✓	
	IS412		✓	✓		✓		✓				
	IS411	✓	✓	✓	✓							
	IS413	✓	✓		✓	✓		✓	✓			
	IS414				✓		✓	✓	✓	✓	✓	
	IS415			✓		✓	✓					
	IS416	✓			✓		✓			✓		
	IS417	✓	✓	✓	✓							
	IS441	✓		✓	✓	✓		✓	✓			
	IS442	✓		✓	✓	✓		✓	✓			
	IS451				✓	✓						
	IS452		✓	✓		✓		✓				
	IS453	✓	✓	✓	✓							
	IT411	✓	✓		✓	✓		✓	✓			
	IT441				✓		✓	✓	✓			
	IT471			✓		✓	✓					
	IS411	✓			✓		✓					
	IS412	✓	✓	✓	✓							
	IS413	✓		✓	✓	✓		✓	✓			
	IS414	✓		✓	✓	✓		✓	✓			
	IS415	✓			✓		✓					
	IS416	✓	✓	✓	✓							
	IS417	✓		✓	✓	✓		✓	✓			
	IS441	✓		✓	✓	✓		✓	✓			
	IS442	✓		✓	✓	✓		✓	✓			
	IS451	✓			✓		✓					
	IT471	✓	✓	✓	✓							
		c1	c2	c3	C4	C5	C6	C7	C8	c9	C10	

	Course	d1	d2	d3	d4	d5	d6	d7	d8	d 9	d10	d11	d 12	d 13	d 14	d 15	d1 6
1st Level	CS141																
	IT101	✓	✓	✓	✓												
	MATH101	✓		✓													
	MATH102	✓		✓													
	PHYS101	✓	✓	✓													
	PHYS102	✓	✓														
	EE101	✓	✓	✓			✓										
	EE102	✓	✓			✓											
	HUM111																
	HUM121	✓	✓		✓												
	HUM132	✓	✓														
	HUM112	✓		✓													
	HUM122	✓		✓													
	HUM131	✓	✓														
	HUM133	✓	✓	✓													
	HUM141	✓	✓														
	HUM142	✓	✓	✓													
	HUM151	✓	✓	✓													
	HUM152	✓	✓	✓													
	HUM153		✓	✓													
	HUM154	✓	✓	✓													
2nd Level	CS201	✓	✓	✓													
	CS211	✓	✓														
	CS241	✓	✓	✓													
	IS201	✓	✓	✓													
	MATH202	✓	✓	✓													
	HUM231	✓	✓														
	HUM232	✓	✓	✓													
	HUM241	✓	✓	✓													
	IS211	✓	✓	✓	✓		✓	✓		✓	✓						
	IS212	✓	✓	✓	✓		✓	✓		✓	✓						
	IS221	✓	✓	✓	✓		✓	✓		✓	✓						
	IS231	✓	✓	✓	✓				✓		✓				✓		✓
	IT251	✓	✓	✓													
	EE201	✓	✓	✓													
3rd Level	CS322	✓	✓	✓			✓										
	CS381	✓	✓			✓											
	CS382	✓	✓	✓	✓	✓											
	CS391	✓	✓	✓	✓												
	IS311	✓	✓	✓	✓		✓	✓		✓	✓						
	IS341	✓	✓	✓	✓		✓	✓		✓	✓						✓
	IS342	✓	✓	✓	✓		✓	✓		✓	✓						
	IT351	✓	✓	✓													
	IT371	✓	✓	✓													
	CS301	✓	✓	✓			✓										
	CS302	✓	✓			✓	✓										
	CS341	✓	✓	✓	✓		✓										
	CS351	✓	✓		✓												

	IS321			✓	✓												✓
	MM301																
	MATH301																
4th Level	IS452	✓	✓	✓	✓		✓	✓		✓	✓						✓
	IS453	✓	✓	✓	✓		✓	✓		✓	✓						✓
	IT411	✓	✓	✓			✓										
	IT441	✓	✓			✓	✓										
	MM412	✓	✓	✓	✓		✓										
	IS411	✓	✓	✓	✓		✓	✓		✓	✓						
	IS412	✓	✓	✓	✓		✓	✓		✓	✓						
	IS411	✓	✓	✓	✓		✓	✓		✓	✓						
	IS413	✓	✓	✓	✓		✓	✓		✓	✓	✓			✓		
	IS414	✓	✓	✓	✓			✓		✓							
	IS415	✓	✓	✓	✓	✓		✓		✓							
	IS416		✓	✓	✓		✓	✓		✓			✓				
	IS417	✓	✓	✓	✓			✓									
	IS441	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓		✓	✓
	IS442	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓		✓	✓
	IS451		✓	✓	✓		✓	✓		✓			✓	✓			
	IS452		✓	✓	✓		✓	✓		✓			✓				
	IS453	✓	✓	✓	✓			✓									
	IT411	✓	✓	✓			✓										
	IT441	✓	✓			✓	✓										
	IT471	✓	✓	✓	✓		✓										
	IS411	✓	✓	✓	✓			✓		✓							
	IS412	✓	✓	✓	✓	✓		✓		✓							
	IS413		✓	✓	✓		✓	✓		✓			✓				
	IS414	✓	✓	✓	✓			✓									
	IS415	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓		✓	✓
	IS416	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓		✓	✓
	IS417		✓	✓	✓		✓	✓		✓			✓	✓			
	IS441		✓	✓	✓		✓	✓		✓			✓				
	IS442		✓	✓	✓		✓	✓		✓			✓				
	IS451	✓	✓	✓	✓			✓									
	IT471	✓	✓	✓			✓										
		d1	d2	d3	d4	d5	d6	d7	d8	d 9	d10	d11	d 12	d 13	d 14	d 15	d1 6

Program Matrix IV (Courses - a. Knowledge and Understanding Skills)

	Code	Course	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19
1st Level	CS141	Programming Fundamentals	✓	✓	✓	✓	✓	✓	✓	✓	✓										
	IT101	IT Fundamentals																		✓	
	MATH101	Mathematics I	✓	✓																	
	MATH102	Mathematics I I	✓	✓	✓	✓	✓														
	PHYS101	Physics I																			
	PHYS102	Physics II	✓												✓						
	EE101	Electronics	✓																		
	EE102	Digital Circuits	✓																		
	HUM111	English Language I	✓																		
	HUM121	Social Context of Computing	✓	✓	✓																
	HUM132	Interpersonal Communication	✓	✓	✓																
	HUM112	English Language II	✓	✓																	
	HUM122	Intellectual Property	✓	✓																	
	HUM131	Organizational Behavior	✓	✓																	
	HUM133	Computing Economics	✓	✓	✓	✓	✓	✓													
	HUM141	Computer Law	✓	✓	✓	✓	✓														
	HUM142	Privacy and Civil Liberties	✓	✓	✓																
	HUM151	Hand Drawing	✓	✓	✓	✓															
	HUM152	History of Computing	✓	✓	✓	✓	✓	✓	✓	✓	✓										
	HUM153	Islamic Culture	✓	✓																	
	HUM154	Scientific Thinking	✓	✓																	
2nd Level	CS201	Discrete Structures	✓	✓																	
	CS211	Data Structures and Algorithms	✓	✓	✓	✓	✓														
	CS241	Object-Oriented Programming	✓	✓	✓	✓	✓														
	IS201	Foundations of Information Systems	✓	✓	✓	✓	✓	✓	✓												

	MATH202	Probability and Statistics	✓	✓	✓	✓	✓													
	HUM231	Business Administration	✓	✓																
	HUM232	Technical Writing	✓	✓	✓															
	HUM241	Computers and Ethics	✓	✓																
	IS211	File Organization	✓	✓	✓	✓	✓	✓	✓	✓	✓									
	IS212	Databases	✓	✓	✓	✓	✓	✓	✓	✓										
	IS221	Project Management	✓	✓																
	IS231	Systems Analysis and Design	✓	✓	✓	✓	✓													
	IT251	Data Communications	✓	✓	✓	✓	✓	✓	✓											
	EE201	Digital Signal Processing	✓	✓	✓															
3rd Level	CS322	Computer Architecture and Operating Systems													✓					✓
	CS381	Software Development and Professional Practice	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	CS382	Field Training	✓	✓	✓	✓		✓												
	CS391	Software Engineering		✓	✓	✓	✓	✓	✓	✓	✓									
	IS311	Geographical Information Systems	✓	✓	✓	✓	✓													
	IS341	Decision Support Systems	✓	✓	✓	✓	✓	✓	✓	✓										
	IS342	IS Strategy, Management and Acquisition	✓	✓	✓	✓	✓	✓	✓	✓										
	IT351	Computer Networks	✓	✓	✓	✓	✓	✓	✓											
	IT371	Web Programming	✓	✓	✓	✓	✓	✓	✓	✓										
	CS301	Operation Research	✓	✓	✓															
	CS302	Simulation and Modeling	✓	✓	✓	✓														
	CS341	Visual Programming	✓	✓	✓	✓	✓	✓												
	CS351	Computer Graphics	✓	✓	✓	✓	✓	✓	✓											
	IS321	Advanced Project Management	✓	✓																
	MM301	Introduction to Multimedia Technology	✓	✓	✓															

	MATH301	Numerical Analysis	✓	✓	✓															
4th Level	IS411	Advanced Database	✓	✓	✓															
	IS412	Distributed and Object Databases	✓	✓	✓	✓														
	IS411	Advanced Database	✓	✓	✓															
	IS413	Web Information Systems	✓	✓	✓	✓														
	IS414	Data Mining and Business Intelligence	✓	✓	✓	✓														
	IS415	Database Administration	✓	✓																
	IS416	Transaction Processing	✓	✓	✓	✓	✓	✓	✓	✓	✓									
	IS417	Multimedia Databases	✓	✓																
	IS441	Quality Assurance of Information Systems	✓	✓	✓	✓	✓	✓	✓	✓	✓									
	IS442	IS Application Development	✓	✓	✓	✓	✓	✓	✓	✓	✓									
	IS451	Social Information Systems	✓	✓																
	IS452	Capstone Project I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	IS453	Capstone Project II	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	IT411	Information Assurance and Security	✓	✓	✓	✓	✓	✓	✓	✓										
	IT441	Enterprise Architecture	✓	✓	✓	✓	✓	✓												
	IT471	E-commerce	✓	✓	✓	✓	✓	✓												
	IS411	Advanced Database	✓	✓	✓															
	IS412	Distributed and Object Databases	✓	✓	✓	✓														
	IS413	Web Information Systems	✓	✓	✓	✓														
	IS414	Data Mining and Business Intelligence	✓	✓	✓	✓														
	IS415	Database Administration	✓	✓																
	IS416	Transaction Processing	✓	✓	✓	✓	✓	✓	✓	✓	✓									

	IS417	Multimedia Databases	✓	✓																
	IS441	Quality Assurance of Information Systems	✓	✓	✓	✓	✓	✓	✓	✓	✓									
	IS442	IS Application Development	✓	✓	✓	✓	✓	✓	✓	✓	✓									
	IS451	Social Information Systems	✓	✓																
	IT471	E-commerce	✓	✓	✓	✓	✓	✓												
			a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15	a16	a17	a18	a1

Program Matrix IV (Courses - Intellectual Skills)

	Code	Course	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17	b18	b19
1st Level	CS141	Programming Fundamentals	✓	✓	✓	✓															
	IT101	IT Fundamentals			✓																
	MATH10	Mathematics I		✓	✓	✓	✓	✓													
	MATH10	Mathematics I I	✓	✓	✓	✓	✓	✓													
	PHYS101	Physics I																			
	PHYS102	Physics II			✓				✓			✓									
	EE101	Electronics		✓		✓		✓	✓												
	EE102	Digital Circuits		✓		✓		✓	✓												
	HUM111	English Language I	✓	✓																	
	HUM12	Social Context of Computing	✓	✓	✓																
	HUM13	Interpersonal Communication	✓	✓	✓																
	HUM11	English Language II	✓	✓	✓																
	HUM12	Intellectual Property	✓	✓	✓																
	HUM13	Organizational Behavior	✓	✓	✓																
	HUM13	Computing Economics	✓																		
	HUM14	Computer Law	✓	✓	✓	✓	✓														
	HUM14	Privacy and Civil Liberties	✓	✓	✓	✓															
	HUM15	Hand Drawing	✓	✓	✓	✓															
	HUM15	History of Computing	✓	✓	✓																
	HUM15	Islamic Culture	✓	✓	✓																
	HUM15	Scientific Thinking	✓	✓																	
2nd Level	CS201	Discrete Structures	✓	✓	✓	✓	✓	✓													
	CS211	Data Structures and Algorithms	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	CS241	Object-Oriented Programming	✓	✓	✓	✓	✓														
	IS201	Foundations of Information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									
	MATH2	Probability and Statistics	✓	✓	✓	✓	✓	✓													
	HUM23	Business Administration	✓	✓	✓																
	HUM23	Technical Writing	✓	✓	✓																
	HUM24	Computers and Ethics	✓	✓	✓																
	IS211	File Organization	✓	✓	✓	✓															
	IS212	Databases	✓	✓	✓	✓															
	IS221	Project Management	✓	✓																	
	IS231	Systems Analysis and Design	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
	IT251	Data Communications	✓	✓	✓	✓															
	EE201	Digital Signal Processing	✓	✓	✓	✓	✓														
3rd Level	CS322	Computer Architecture and		✓															✓		
	CS381	Software Development and	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
	CS382	Field Training	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									
	CS391	Software Engineering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
	IS311	Geographical Information	✓	✓	✓	✓	✓														
	IS341	Decision Support Systems	✓	✓	✓	✓	✓	✓	✓	✓											
	IS342	IS Strategy, Management and	✓	✓	✓	✓	✓	✓	✓	✓											
	IT351	Computer Networks	✓	✓	✓	✓	✓														
	IT371	Web Programming	✓	✓	✓																
	CS301	Operation Research	✓	✓																	
	CS302	Simulation and Modeling	✓	✓																	
	CS341	Visual Programming	✓	✓	✓	✓	✓														
	CS351	Computer Graphics	✓	✓	✓	✓	✓	✓													
	IS321	Advanced Project Management	✓																		
	MM301	Introduction to Multimedia	✓	✓	✓	✓	✓	✓													
	MATH3	Numerical Analysis	✓	✓	✓	✓	✓	✓													
Le	IS411	Advanced Database	✓	✓	✓	✓															

	IS412	Distributed and Object	✓	✓	✓	✓	✓	✓												
	IS411	Advanced Database	✓	✓	✓	✓														
	IS413	Web Information Systems	✓	✓	✓	✓	✓													
	IS414	Data Mining and Business	✓	✓	✓	✓	✓													
	IS415	Database Administration	✓	✓	✓															
	IS416	Transaction Processing	✓	✓	✓	✓														
	IS417	Multimedia Databases	✓	✓	✓	✓														
	IS441	Quality Assurance of	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	IS442	IS Application Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	IS451	Social Information Systems	✓	✓	✓															
	IS452	Capstone Project I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	IS453	Capstone Project II	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	IT411	Information Assurance and	✓	✓	✓	✓	✓	✓												
	IT441	Enterprise Architecture	✓	✓	✓	✓	✓													
	IT471	E-commerce	✓	✓																
	IS411	Advanced Database	✓	✓	✓	✓														
	IS412	Distributed and Object	✓	✓	✓	✓	✓	✓												
	IS413	Web Information Systems	✓	✓	✓	✓	✓													
	IS414	Data Mining and Business	✓	✓	✓	✓	✓													
	IS415	Database Administration	✓	✓	✓															
	IS416	Transaction Processing	✓	✓	✓	✓														
	IS417	Multimedia Databases	✓	✓	✓	✓														
	IS441	Quality Assurance of	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	IS442	IS Application Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	IS451	Social Information Systems	✓	✓	✓															
	IT471	E-commerce	✓	✓																
			b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17	b18	b19

Program Matrix V (Courses - Professional and Practical Skills)

	Code	Course	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10
1st Level	CS141	Programming Fundamentals	✓	✓	✓	✓	✓					
	IT101	IT Fundamentals	✓	✓	✓	✓						
	MATH10	Mathematics I	✓	✓	✓							
	MATH10	Mathematics I I	✓	✓	✓	✓						
	PHYS101	Physics I	✓✓	✓	✓	✓	✓	✓				
	PHYS102	Physics II				✓		✓			✓	
	EE101	Electronics						✓			✓	
	EE102	Digital Circuits						✓	✓	✓	✓	
	HUM111	English Language I	✓	✓	✓							
	HUM12	Social Context of Computing	✓	✓	✓							
	HUM13	Interpersonal Communication	✓	✓	✓							
	HUM11	English Language II	✓	✓	✓							
	HUM12	Intellectual Property	✓	✓	✓	✓						
	HUM13	Organizational Behavior	✓	✓	✓							
	HUM13	Computing Economics	✓	✓	✓	✓						
	HUM14	Computer Law	✓	✓	✓							
	HUM14	Privacy and Civil Liberties	✓	✓	✓							
	HUM15	Hand Drawing	✓	✓	✓							
	HUM15	History of Computing	✓	✓	✓	✓						
	HUM15	Islamic Culture	✓	✓	✓							
	HUM15	Scientific Thinking	✓									
2nd Level	CS201	Discrete Structures	✓	✓	✓	✓						
	CS211	Data Structures and	✓	✓	✓	✓	✓	✓	✓			
	CS241	Object-Oriented Programming	✓	✓	✓	✓	✓	✓	✓			
	IS201	Foundations of Information	✓	✓	✓	✓	✓	✓	✓	✓		
	MATH2	Probability and Statistics	✓	✓	✓	✓						
	HUM23	Business Administration	✓	✓	✓							
	HUM23	Technical Writing	✓	✓	✓							
	HUM24	Computers and Ethics	✓	✓	✓							
	IS211	File Organization	✓	✓✓	✓	✓	✓	✓				
	IS212	Databases	✓	✓	✓	✓	✓	✓				
	IS221	Project Management	✓									
	IS231	Systems Analysis and Design	✓	✓	✓	✓	✓					
	IT251	Data Communications	✓	✓	✓	✓	✓					
	EE201	Digital Signal Processing	✓	✓	✓	✓						
3rd Level	CS322	Computer Architecture and	✓	✓	✓	✓	✓	✓	✓			
	CS381	Software Development and	✓	✓✓	✓	✓	✓	✓				
	CS382	Field Training	✓	✓	✓	✓	✓	✓	✓	✓		
	CS391	Software Engineering	✓	✓	✓	✓	✓	✓				
	IS311	Geographical Information	✓	✓	✓	✓	✓					
	IS341	Decision Support Systems	✓	✓	✓	✓	✓	✓	✓			
	IS342	IS Strategy, Management and	✓	✓	✓	✓	✓	✓	✓			
	IT351	Computer Networks	✓	✓	✓	✓	✓	✓	✓			
	IT371	Web Programming	✓	✓	✓	✓	✓	✓	✓			
	CS301	Operation Research	✓		✓							
	CS302	Simulation and Modeling	✓	✓								
	CS341	Visual Programming	✓	✓	✓	✓	✓					
	CS351	Computer Graphics	✓	✓	✓	✓						
	IS321	Advanced Project	✓									
	MM301	Introduction to Multimedia	✓	✓	✓	✓	✓	✓	✓			
	MATH3	Numerical Analysis	✓	✓	✓	✓	✓	✓	✓			

4th Level												
	IS412	Distributed and Object	✓	✓								
	IS411	Advanced Database	✓	✓								
	IS413	Web Information Systems	✓	✓	✓	✓	✓	✓				
	IS414	Data Mining and Business	✓	✓								
	IS415	Database Administration	✓	✓	✓	✓						
	IS416	Transaction Processing	✓	✓	✓	✓	✓	✓				
	IS417	Multimedia Databases	✓	✓	✓	✓	✓	✓				
	IS441	Quality Assurance of	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	IS442	IS Application Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	IS451	Social Information Systems	✓	✓	✓							
	IS452	Capstone Project I	✓	✓	✓	✓	✓	✓				
	IS453	Capstone Project II	✓	✓	✓	✓	✓	✓				
	IT411	Information Assurance and	✓	✓	✓	✓						
	IT441	Enterprise Architecture	✓	✓	✓	✓	✓	✓				
	IT471	E-commerce	✓	✓✓								

Program Matrix VI (Courses - Transferable Skills)

	Code	Course	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11	d12	d13	d14	d15	d16
1st Level	CS141	Programming Fundamentals	✓	✓	✓	✓	✓	✓										
	IT101	IT Fundamentals	✓	✓	✓	✓												
	MATH101	Mathematics I	✓	✓	✓													
	MATH102	Mathematics I I	✓	✓	✓													
	PHYS101	Physics I	✓	✓	✓	✓	✓	✓										
	PHYS102	Physics II				✓		✓	✓					✓	✓			
	EE101	Electronics		✓		✓		✓	✓					✓	✓			
	EE102	Digital Circuits		✓		✓		✓	✓					✓	✓			
	HUM111	English Language I	✓	✓	✓	✓	✓	✓	✓									
	HUM121	Social Context of Computing	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	HUM132	Interpersonal Communication	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	HUM112	English Language II	✓	✓	✓	✓	✓	✓	✓									
	HUM122	Intellectual Property	✓	✓	✓	✓	✓	✓	✓									
	HUM131	Organizational Behavior	✓	✓	✓	✓	✓	✓	✓									
	HUM133	Computing Economics	✓	✓	✓	✓	✓	✓	✓									
	HUM141	Computer Law	✓	✓	✓	✓	✓	✓	✓									
	HUM142	Privacy and Civil Liberties	✓	✓	✓													
	HUM151	Hand Drawing	✓	✓	✓													
	HUM152	History of Computing	✓	✓	✓													
	HUM153	Islamic Culture	✓	✓	✓													
	HUM154	Scientific Thinking	✓	✓	✓													
2nd Level	CS201	Discrete Structures	✓	✓	✓	✓												
	CS211	Data Structures and	✓	✓	✓	✓	✓											
	CS241	Object-Oriented Programming	✓	✓	✓	✓	✓											
	IS201	Foundations of Information	✓	✓	✓	✓	✓	✓	✓									
	MATH20	Probability and Statistics	✓	✓	✓													
	HUM231	Business Administration	✓	✓	✓	✓	✓	✓	✓									
	HUM232	Technical Writing	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	HUM241	Computers and Ethics	✓	✓	✓	✓	✓	✓	✓									
	IS211	File Organization	✓	✓	✓	✓	✓	✓										
	IS212	Databases	✓	✓	✓	✓	✓	✓	✓									
	IS221	Project Management	✓	✓	✓	✓	✓	✓										
	IS231	Systems Analysis and Design	✓	✓	✓	✓	✓	✓	✓	✓								
	IT251	Data Communications	✓	✓	✓	✓	✓	✓										
	EE201	Digital Signal Processing	✓	✓	✓	✓												
3rd Level	CS322	Computer Architecture and		✓						✓					✓	✓		✓
	CS381	Software Development and	✓	✓	✓	✓	✓	✓										
	CS382	Field Training	✓	✓	✓	✓	✓	✓										
	CS391	Software Engineering	✓	✓	✓	✓	✓	✓										
	IS311	Geographical Information	✓	✓	✓	✓	✓	✓										
	IS341	Decision Support Systems	✓	✓	✓	✓	✓	✓	✓									
	IS342	IS Strategy, Management and	✓	✓	✓	✓	✓	✓										
	IT351	Computer Networks	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	IT371	Web Programming	✓	✓	✓	✓	✓	✓	✓									
	CS301	Operation Research																
	CS302	Simulation and Modeling	✓	✓	✓													
	CS341	Visual Programming	✓	✓	✓	✓	✓	✓										
	CS351	Computer Graphics	✓	✓	✓	✓	✓	✓	✓	✓								
	IS321	Advanced Project Management	✓															
	MM301	Introduction to Multimedia	✓	✓	✓	✓	✓	✓	✓									
	MATH30	Numerical Analysis	✓	✓	✓	✓	✓	✓	✓									
Le	IS411	Advanced Database	✓	✓	✓	✓	✓	✓										

	IS412	Distributed and Object	✓	✓	✓	✓	✓	✓										
	IS413	Web Information Systems	✓	✓	✓	✓	✓	✓	✓	✓								
	IS414	Data Mining and Business	✓	✓	✓	✓	✓	✓	✓	✓								
	IS415	Database Administration	✓	✓	✓	✓	✓	✓	✓									
	IS416	Transaction Processing	✓	✓	✓	✓	✓	✓										
	IS417	Multimedia Databases	✓	✓	✓	✓	✓	✓										
	IS441	Quality Assurance of	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	IS442	IS Application Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	IS451	Social Information Systems	✓	✓	✓	✓	✓	✓	✓									
	IS452	Capstone Project I	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	IS453	Capstone Project II	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	IT411	Information Assurance and	✓	✓	✓	✓	✓	✓										
	IT441	Enterprise Architecture	✓	✓	✓	✓	✓											
	IT471	E-commerce	✓	✓	✓	✓	✓	✓	✓									

Program Matrix VII (Aims - ILOs)

Knowledge and Understanding Skills

Program Aims		a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19
I	Improving Organizational Processes	✓			✓	✓										✓				✓
II	Exploiting Opportunities Created by Technology Innovations						✓										✓	✓		
III	Understanding and Addressing Information Requirements	✓	✓	✓	✓		✓	✓											✓	
IV	Designing and Managing Enterprise Architecture					✓				✓	✓		✓			✓				
V	Identifying and Evaluating Solution and Sourcing Alternatives											✓		✓			✓			
VI	Securing Data and Infrastructure	✓			✓				✓											
VII	Understanding, Managing and Controlling IT Risks			✓											✓		✓			

Intellectual Skills

Program Aims		b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17	b18	b19
I	Improving Organizational Processes	✓	✓						✓	✓							✓			✓
II	Exploiting Opportunities Created by Technology Innovations									✓										
III	Understanding and Addressing Information Requirements			✓	✓		✓		✓		✓	✓				✓		✓		
IV	Designing and Managing Enterprise Architecture		✓					✓					✓		✓					
V	Identifying and Evaluating Solution and Sourcing Alternatives		✓	✓	✓	✓		✓					✓	✓	✓				✓	
VI	Securing Data and Infrastructure		✓															✓		
VII	Understanding, Managing and Controlling IT Risks						✓		✓		✓			✓						

Professional and Practical Skills

Program Aims		c1	c2	c3	c4	c5	c6	c7	c8	c9	c10
I	Improving Organizational Processes		✓	✓	✓		✓				✓
II	Exploiting Opportunities Created by Technology Innovations		✓			✓					
III	Understanding and Addressing Information Requirements			✓			✓		✓	✓	
IV	Designing and Managing Enterprise Architecture		✓		✓			✓			
V	Identifying and Evaluating Solution and Sourcing Alternatives	✓			✓			✓			✓
VI	Securing Data and Infrastructure				✓				✓		
VII	Understanding, Managing and Controlling IT Risks		✓		✓		✓				

Transferable Skills

Program Aims		d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11	d12	d13	d14	d15	d16
I	Improving Organizational Processes	✓	✓				✓			✓	✓		✓	✓			
II	Exploiting Opportunities Created by Technology Innovations			✓		✓			✓			✓			✓		✓
III	Understanding and Addressing Information Requirements	✓			✓						✓					✓	
IV	Designing and Managing Enterprise Architecture	✓			✓												
V	Identifying and Evaluating Solution and Sourcing Alternatives	✓			✓						✓						
VI	Securing Data and Infrastructure	✓									✓						
VII	Understanding, Managing and Controlling IT Risks				✓			✓			✓		✓				

TEACHING AND LEARNING METHODS

	Intended Learning Outcomes (ILO's) of the program	Teaching and Learning Methods						
		Lecture	Tutorials exercises	Practical exercises	Workshops	Projects	Case study	Data collection
Knowledge and Understanding	**By the end of the program, student should be able to:**							
	a1. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics	✓	✓					
	a2. Demonstrate strong knowledge of information systems.	✓		✓		✓	✓	
	a3. Demonstrate strong skills of database management systems.	✓		✓		✓	✓	✓
	a4. Describe the principles and techniques of a number of application areas informed by the research directions of information systems.	✓		✓		✓	✓	
	a5. Explain the broad context within which information systems including issues such as quality and reliability.	✓						
	a6. Identify information systems applications, such as accounting, health informatics, medical informatics, etc.	✓		✓		✓		
	a7. Identify selected specialist fields at the forefront of information systems.	✓						
	a8. Discuss the principles of Information communication and information security.	✓		✓				
	a9. Describe the challenges inherent in the maintenance and evolution of software systems, and the techniques and best practices currently available for dealing with them.	✓						
	a10. Discuss some aspects of object-oriented analysis and design.	✓		✓				
	a11. Explain decision support tools and systems.	✓		✓				
	a12. Identify various approaches to Management Sciences (MS) such as Operation Management, Inventory Management, Project Management, and Supply Chain Management.	✓		✓		✓		
	a13. Interpret and analyze data qualitatively and/or quantitatively.	✓		✓		✓		
	a14. Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems, data structures and algorithms, software engineering techniques and information retrieval.	✓		✓				
	a15. Demonstrate a deep knowledge of business area analysis and the enterprise architecture.	✓		✓		✓	✓	
	a16. Define the tools, practices and methodologies used in the specification, design, implementation and critical evaluation of computer and information systems.	✓						

	Intended Learning Outcomes (ILO's) of the program	Teaching and Learning Methods						
		Lecture	Tutorials exercises	Practical exercises	Workshops	Projects	Case study	Data collection
	a17. Define the methods used in defining and assessing criteria for measuring the extent to which an information system is appropriate for its current deployment and future evolution.	✓						
	a18. Describe the current and underlying technologies that support computer processing and inter-computer communication.	✓						
	a19. Discuss developments in research fields across a range of knowledge areas.	✓				✓		
Intellectual Skills	b1. Define traditional and nontraditional information systems problems, set goals towards solving them, and observe results.	✓						
	b2. Perform comparisons between (methods, techniques...etc).	✓	✓	✓		✓	✓	✓
	b3. Identify attributes, components, relationships, patterns, main ideas, and errors.	✓	✓	✓		✓		
	b4. Summarize the proposed solutions and their results.	✓	✓	✓		✓	✓	
	b5. Restrict solution methodologies upon their results.	✓	✓	✓		✓		
	b6. Establish criteria, and verify solutions.	✓	✓	✓		✓		
	b7. Identify a range of solutions and critically evaluate and justify proposed design solutions.	✓	✓	✓		✓		
	b8. Solve information systems problems with pressing commercial or industrial constraints.	✓	✓	✓		✓		
	b9. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.	✓	✓	✓		✓		
	b10. Perform problem analysis from written descriptions	✓	✓	✓		✓		
	b11. Derive requirements specifications from an understanding of problems (analysis, synthesis).	✓	✓	✓		✓		
	b12. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application).	✓	✓	✓		✓		
	b13. Solve a decision model with appropriate techniques.	✓	✓	✓		✓		
	b14. Solve complex problems within and between enterprises.	✓	✓	✓		✓	✓	
	b15. Perform improvement of a system that benefits stakeholders.	✓		✓				
	b16. Recognize the professional, moral and ethical issues involved in the exploitation of Information Technology and be guided by their adoption, reflect on issues of professional practice within the discipline.	✓						
	b17. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline.	✓						
	b18. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences.	✓		✓				
	b19. Generate and evaluate the results of tests to investigate the functionality of information systems.			✓		✓		

	Intended Learning Outcomes (ILO's) of the program	Teaching and Learning Methods						
		Lecture	Tutorials exercises	Practical exercises	Workshops	Projects	Case study	Data collection
Professional Skills	c1. Use appropriate programming languages.	✓		✓		✓		
	c2. Use appropriate web-based systems and tools, and design methodologies.	✓		✓		✓		
	c3. Use appropriate database management systems.	✓		✓		✓		
	c4. Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video.	✓		✓		✓		
	c5. 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.	✓		✓		✓		
	c6. Identify any risks or safety aspects that may be involved within a given context.	✓	✓	✓		✓		
	c7. 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.	✓		✓		✓	✓	
	c8. Implement data and model centered systems.	✓		✓		✓		
	c9. Operate computing equipment effectively, recognizing its logical and physical properties, capabilities and limitations.					✓		
	c10. Commercialize knowledge and skills to computing community and industry.					✓		
General Skills	d1. Collaborate effectively within multidisciplinary team.			✓		✓		
	d2. Work in stressful environment and within constraints.			✓		✓		
	d3. Communicate effectively using a variety of communication methods.			✓		✓		
	d4. Communicate effectively with team members, managers and customers.	✓		✓		✓		✓
	d5. Demonstrate efficient IT capabilities.			✓		✓		
	d6. Lead and motivate individuals.			✓		✓		
	d7. Manage tasks and resources.			✓		✓		
	d8. Search for information and adopt life-long self-learning.	✓		✓		✓		
	d9. Acquire entrepreneurial skills.			✓				
	d10. Acquire analytical thinking and problem solving skills	✓		✓		✓		
	d11. Effectively employ information-retrieval skills, (including the use of browsers, search engines, and on-line library catalogues).	✓		✓				
	d12. Ability to work independently and as part of a team with minimum guidance.			✓		✓		
	d13. Manage one's own learning and development, including time management and organizational skills.			✓		✓		
	d14. Prepare their work in the form of reports, oral presentations or an internet web site.	✓		✓		✓		

Intended Learning Outcomes (ILO's) of the program	Teaching and Learning Methods						
	Lecture	Tutorials exercises	Practical exercises	Workshops	Projects	Case study	Data collection
d15. Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension.					✓		
d16. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material.	✓		✓		✓		

1- ASSESMENT METHODS

Intended Learning Outcomes (ILO's) of the program		Assessment methods				
		Final Exam	Mid-Term Exam	Practical Exam	Class Work	Oral Exam
Knowledge and Understanding	**By the end of the program, student should be able to:**					
	a1. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics	✓	✓	✓	✓	
	a2. Demonstrate strong knowledge of information systems.	✓	✓	✓	✓	
	a3. Demonstrate strong skills of database management systems.	✓	✓	✓	✓	
	a4. Describe the principles and techniques of a number of application areas informed by the research directions of information systems.	✓	✓	✓	✓	
	a5. Explain the broad context within which information systems including issues such as quality and reliability.	✓	✓			
	a6. Identify information systems applications, such as accounting, health informatics, medical informatics, etc.	✓	✓	✓		
	a7. Identify selected specialist fields at the forefront of information systems.	✓	✓			
	a8. Discuss the principles of Information communication and information security.	✓	✓	✓	✓	
	a9. Describe the challenges inherent in the maintenance and evolution of software systems, and the techniques and best practices currently available for dealing with them.	✓	✓			
	a10. Discuss some aspects of object-oriented analysis and design.	✓	✓	✓	✓	
	a11. Explain decision support tools and systems.	✓	✓	✓	✓	
	a12. Identify various approaches to Management Sciences (MS) such as Operation Management, Inventory Management, Project Management, and Supply Chain Management.	✓	✓	✓	✓	
	a13. Interpret and analyze data qualitatively and/or quantitatively.	✓	✓	✓		
	a14. Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems, data structures and algorithms, software engineering techniques and information retrieval.	✓	✓	✓	✓	

Intended Learning Outcomes (ILO's) of the program		Assessment methods				
		Final Exam	Mid-Term Exam	Practical Exam	Class Work	Oral Exam
	a15. Demonstrate a deep knowledge of business area analysis and the enterprise architecture.	✓	✓	✓	✓	
	a16. Define the tools, practices and methodologies used in the specification, design, implementation and critical evaluation of computer and information systems.	✓	✓	✓	✓	
	a17. Define the methods used in defining and assessing criteria for measuring the extent to which an information system is appropriate for its current deployment and future evolution.	✓	✓	✓	✓	
	a18. Describe the current and underlying technologies that support computer processing and inter-computer communication.	✓	✓	✓	✓	
	a19. Discuss developments in research fields across a range of knowledge areas.	✓	✓			
Intellectual Skills	b1. Define traditional and nontraditional information systems problems, set goals towards solving them, and observe results.	✓	✓	✓	✓	
	b2. Perform comparisons between (methods, techniques...etc).	✓	✓	✓	✓	
	b3. Identify attributes, components, relationships, patterns, main ideas, and errors.	✓	✓	✓	✓	
	b4. Summarize the proposed solutions and their results.	✓	✓	✓	✓	
	b5. Restrict solution methodologies upon their results.	✓	✓	✓	✓	
	b6. Establish criteria, and verify solutions.	✓	✓	✓	✓	
	b7. Identify a range of solutions and critically evaluate and justify proposed design solutions.	✓	✓	✓	✓	
	b8. Solve information systems problems with pressing commercial or industrial constraints.	✓	✓	✓	✓	
	b9. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.	✓	✓	✓	✓	
	b10. Perform problem analysis from written descriptions	✓	✓	✓	✓	
	b11. Derive requirements specifications from an understanding of problems (analysis, synthesis).	✓	✓	✓	✓	
	b12. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application).	✓	✓	✓	✓	
	b13. Solve a decision model with appropriate techniques.	✓	✓	✓	✓	
	b14. Solve complex problems within and between enterprises.	✓	✓			
	b15. Perform improvement of a system that benefits stakeholders.	✓	✓	✓	✓	
	b16. Recognize the professional, moral and ethical issues involved in the exploitation of Information Technology and be guided by their adoption, reflect on issues of professional practice within the discipline.	✓	✓			
	b17. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline.	✓				
	b18. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences.	✓	✓	✓	✓	
	b19. Generate and evaluate the results of tests to investigate the functionality of information systems.	✓	✓	✓	✓	
Professional Skills	c1. Use appropriate programming languages.	✓	✓	✓	✓	
	c2. Use appropriate web-based systems and tools, and design methodologies.	✓	✓	✓	✓	
	c3. Use appropriate database management systems.	✓	✓	✓	✓	
	c4. Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video.	✓	✓	✓	✓	

	Intended Learning Outcomes (ILO's) of the program	Assessment methods				
		Final Exam	Mid-Term Exam	Practical Exam	Class Work	Oral Exam
	c5. 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.					
	c6. Identify any risks or safety aspects that may be involved within a given context.	✓	✓	✓	✓	
	c7. 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.	✓	✓	✓	✓	
	c8. Implement data and model centered systems.	✓	✓	✓	✓	
	c9. Operate computing equipment effectively, recognizing its logical and physical properties, capabilities and limitations.	✓	✓	✓	✓	
	c10. Commercialize knowledge and skills to computing community and industry.	✓	✓	✓	✓	
General Skills	d1. Collaborate effectively within multidisciplinary team.			✓	✓	
	d2. Work in stressful environment and within constraints.			✓	✓	
	d3. Communicate effectively using a variety of communication methods.			✓	✓	
	d4. Communicate effectively with team members, managers and customers.			✓	✓	
	d5. Demonstrate efficient IT capabilities.			✓	✓	
	d6. Lead and motivate individuals.			✓	✓	
	d7. Manage tasks and resources.			✓	✓	
	d8. Search for information and adopt life-long self-learning.	✓		✓	✓	
	d9. Acquire entrepreneurial skills.			✓	✓	
	d10. Acquire analytical thinking and problem solving skills	✓		✓	✓	
	d11. Effectively employ information-retrieval skills, (including the use of browsers, search engines, and on-line library catalogues).			✓		
	d12. Ability to work independently and as part of a team with minimum guidance.			✓	✓	
	d13. Manage one's own learning and development, including time management and organizational skills.			✓	✓	
	d14. Prepare their work in the form of reports, oral presentations or an internet web site.			✓	✓	
	d15. Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension.			✓	✓	
	d16. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material.			✓	✓	

Program Coordinator: prof. Taysir H. Abdel-Hamid

Signature:

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