

Multimedia

Undergraduate Program

2017-2018



Faculty of
Computers and Information

Dept. of Multimedia



Assiut University

Faculty of Computers &
Information

Multimedia Undergraduate Program

(Credit Hours System)

2017- 2018



*Assiut University
Faculty of Computers & Information
Department of Multimedia
Quality Assurance Unit*



MM Undergraduate Program

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MM Undergraduate Program Specifications

A. Basic Information

1. **Program Title:** Multimedia
2. **Program Type:** Single
3. **Faculty (Faculties):** Faculty of Computers and Information
4. **Department:** Multimedia
5. **Assistant Coordinator:** Dr. Khaled Fatehy Hussain
6. **Coordinator:** Prof. Adel A. Sweisy
7. **Last date of program specifications approval:** 2017- 2018

B. Professional Information

1. Program Aims

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 multimedia systems. Specifically, based on the constitutions of the Computing Curricula (ACM/IEEE) out MM program aims to provide the student with:

- I. Multimedia System-level perspective.
- II. Appreciation of the interplay between theory and practice.
- III. Familiarity with common principles.
- IV. Significant project experience.
- V. Attention to rigorous thinking.
- VI. Adaptability.
- VII. Professionalism.
- VIII. Interpersonal skills.

2. Graduate attributes

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

- I. Development of the ability to recognize problems that is amenable to multimedia systems, and knowledge of the multimedia tools necessary for solving such problems.
- II. Understand fundamentals of image and video processing, audio processing, graphics, animation, interactive multimedia, databases, and network.

- III. Implement solutions, including use of appropriate programming languages and multimedia software tools.
- IV. Apply knowledge, skills, and applications of appropriate mathematical techniques, methods, and tools in multimedia.
- V. Specify, design, and implement multimedia systems, and evaluate them in terms of general quality attributes and possible tradeoffs presented within the given problem.
- VI. Apply multimedia solutions to functional, inter-organizational, operational, managerial, and executive problems and opportunities.
- VII. Describe characteristics of various components of multimedia systems, use the appropriate tools and techniques to analyze, design, and construct information systems.
- VIII. Communicate effectively by oral, written and visual means.
- IX. Work effectively as an individual and as a member of a team.
- X. Perform independent and efficient time management.
- XI. Aware of key ethical issues affecting multimedia systems and their responsibilities as multimedia professionals.

3. Intended Learning Outcomes (ILOs)

a. Knowledge and Understanding

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

- a1. Understand the essential mathematics relevant to computer science and multimedia.
- a2. Understand high-level programming languages.
- a3. Demonstrate basic knowledge and understanding of a core of mathematical analysis, algebra, applied mathematics and statistics.
- a4. Interpret data qualitatively and/or quantitatively.
- a5. Know and understand the principles and techniques of a number of application areas informed by the research directions of multimedia.
- a6. Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition, computer vision and Human computer Interaction.
- a7. Understand the fundamental topics in computer systems, including hardware architectures and operating systems.
- a8. Select advanced topics to provide a deeper understanding of some aspects of object-oriented analysis and design, and software engineering.
- a9. Select advanced topics to provide a deeper understanding of some aspects of the artificial intelligence, image processing, and computer graphics and animation.
- a10. Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems.
- a11. Provide a deeper understanding of legal, professional and moral aspects of the exploitation of computing.
- a12. Know the tools, practices and methodologies used in the specification, design, implementation and critical evaluation of multimedia systems.
- a13. Know the methods used in defining and assessing criteria for measuring the extent to which a computer system is appropriate for its current deployment and future evolution.
- a14. Know the current and underlying technologies that support computer processing and inter-computer communication.
- a15. Understand of the principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results.

b. Intellectual Skills

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

- b1. Discuss traditional and nontraditional problems, set goals towards solving them, and observe results.
- b2. Compare between (methods, techniques...etc).
- b3. Apply classifications of (data, results, methods, techniques.. etc.).
- b4. Analyze attributes, components, relationships, patterns, main ideas, and errors.
- b5. Summarize the proposed solutions and their results.
- b6. Restrict solution methodologies upon their results.
- b7. Establish criteria, and verify solutions.
- b8. Show a range of solutions and critically evaluate and justify proposed design solutions.
- b9. Analyze computer science problems with pressing commercial or industrial constraints.
- b10. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.
- b11. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application).
- b12. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline.
- b13. Apply knowledge and methods from a variety of sources
- b14. Analyze requirements of information manipulation and communication problems and design solutions based around appropriate integration of multimedia, Internet and computer software technologies
- b15. Plan, conduct and report on a program of work covering multiple system lifecycle stages and leading to an end-product, with evaluation of the end-product, and the process and technologies employed.
- b16. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences.
- b17. Correlate the results of tests to investigate the functionality of computer systems.

c. Professional and Practical Skills

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

- c1. Use appropriate programming languages and design methodologies.
- c2. Use appropriate web-based systems, tools and design methodologies.
- c3. Specify, design, and implement computer-based 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. 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.
- c7. Make effective use of general computing facilities, plan and manage a project to complete within budget and schedule.
- c8. Manage the need for continuing professional development in recognition of the need for lifelong learning.
- c9. Operate computing equipment efficiently, taking into account its logical and physical properties.
- c10. Apply tools and techniques for the design and development of applications.
- c11. Apply Internet technology
- c12. Prepare technical reports and presentations
- c13. Use appropriate diagrammatic and formal written notations in design work and in reports

- c14. Use a programming language and a variety of software tools and environments to construct, test and document software applications, which may include multimedia components.
- c15. Use multimedia production systems
- c16. Apply software engineering and application technologies to achieve effective communication and interaction with end users

d. General and Transferable Skills

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

- d1. Communicate effectively by oral, written and visual means.
- d2. Work effectively as an individual and as a member of a team.
- d3. Collaborate effectively within multidisciplinary team.
- d4. Work in stressful environment and within constraints.
- d5. Prepare and present seminars to a professional standard.
- d6. Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy.
- d7. Demonstrate efficient IT capabilities.
- d8. Lead and motivate individuals.
- d9. Manage tasks and resources.
- d10. Search for information and adopt life-long self-learning.
- d11. Acquire entrepreneurial skills.
- d12. Manage one's own learning and development.
- d13. Prepare their work in the form of reports.
- d14. Communicate effectively with team members, managers and costumers.
- 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 March 2010.

4b. Comparison of provision to external references

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)
- No. of program Levels (in credit-hours system): 4 levels.

The following table summarizes the program structure.

Subject Area	Credit Hours	MM 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. Humanities, ethical and Social Sciences (Univ. Req.)

Code	Course Name	Credit	R	E	Achieved ILOs
HUM111	English Language I	2	✓		a1-a8,b1-b8,c1-c5,d1-d5
HUM112	English Language II	2		✓	a1,a2,b1-b3,c1-c3,d1-d7
HUM121	Social Context of Computing	1	✓		a1-a3,b1-b3,c1-c3,d1-d9
HUM122	Intellectual Property	1		✓	a1,a2,b1-b3,c1-c3,d1-d7
HUM131	Organizational Behavior	2		✓	a1,a2,b1-b3,c1-c3,d1-d7
HUM132	Interpersonal Communication	2	✓		a1-a3,b1-b3,c1-c3,d1-d9
HUM133	Computing Economics	2		✓	a1-a6,b1,b2,c1-c3,d1-d7
HUM141	Computer Law	2		✓	a1-a5,b1-b5,c1,c3,d1-d4
HUM142	Privacy and Civil Liberties	1		✓	a1-a5,b1-b4,c2,c3,d1-d3
HUM151	Hand Drawing	2		✓	a1-a4,b1,b4,c1-c3,d1-d3
HUM152	History of Computing	2		✓	a2,a4-a6,a9,b1-b3,c1,c2,c4,d1-d3
HUM153	Islamic Culture	1		✓	a1-a3,b2,b3,c1,c3,d2,d3
HUM154	Scientific Thinking	1		✓	a1,a2,b1,b2,c1,d1-d3
HUM231	Business Administration	2	✓		a1,a2,b1-b3,c1-c3,d1-d7
HUM232	Technical Writing	2	✓		a1-a3,b1-b3,c1-c3,d1-d9
HUM241	Computers and Ethics	1	✓		a1,a2,b1,b3,c1,c2,d1-d7
Subtotal			10	8	
Total			18		

6b. Mathematics and Basic Sciences

Code	Course Name	Credit	R	E	Achieved ILOs
MATH101	Mathematics I	3	✓		a1,a2,b1-b6,c1-c3,d1,d3
MATH102	Mathematics II	3	✓		a1-a5,b1-b6,c1-c4,d1,d3
MATH201	Mathematics III	3		✓	a1-a3,b1-b5,c1,c4,d1-d4
MATH202	Probability and Statistics	2	✓		a1-a5,b1-b6c1-,c4,d1-d3
MATH301	Numerical Analysis	3		✓	a1-a3,b1-b6,c1-c7,d1-d7
CS201	Discrete Structures	3		✓	a1-a4,b1-b4,c1,c2,d1,d3

CS301	Operation Research	3		✓	a1,a3-a6,A1,A2,b1-b3,B2,c1,c2
CS302	Simulation and Modeling	3	✓		a1-a4,b1-b4,c1,c2,d1,d3
PHYS101	Physics I	3	✓		a1-a6,b1-b4,c1-c6,d1-d6
PHYS102	Physics II	3	✓		a1-a7,b1-b4,c1-c5,d1-d6
EE101	Electronics	3	✓		a1-a5,b1-b6,c1-c5,d1-d6
EE102	Digital Circuits	2	✓		a1-a8,b1-b8,c1-c5,d1-d5
EE201	Digital Signal Processing	3		✓	a1-a3,b1-b5,c1,c4,d1-d4
Subtotal			22	6	
Total			28		

6c. Basic Computing Sciences (institution req.)

Code	Course Name	Credit	R	E	Achieved ILOs
CS141	Programming Fundamentals	3	✓		a1,a2,a3,a4,a5-a9,b1-b5,c1-c3,d1-d5
CS211	Data Structures and Algorithms	3	✓		a1-a5,b1-b11,c1-c7,d1-d6
CS241	Object-Oriented Programming	3	✓		a1-a5,b1-b11,c1-c7,d1-d6
CS321	Operating Systems	3	✓		a1-a8,b1-b5,c1-c5,d1,d2
CS322	Computer Architecture and Operating Systems	3			a1-a5,b1-b11,c1-c7,d1-d6
CS341	Visual Programming	3		✓	a1-a6,b1-b5,c1-c5,d1-d6
CS351	Computer Graphics	3	✓		a1-a7,b1-b6,c1-c4,d1-d6
CS361	Artificial Intelligence	3		✓	a1-a4,b1-b3,c1-c4,d1-d4
CS391	Software Engineering	3	✓		a1-a10,b1-b15,c1-c6,d1-d6
IS201	Foundations of Information Systems	3		✓	a1-a7,b1-b5,c1-c6,d1,d3-d6
IS211	File Organization	3		✓	a1-a4,a6-a9,b1-b4,c1-c6,d1-d6
IS212	Databases	3	✓		a1-a7,b1-b5,c1-c6,d1,d3-d6
IS231	Systems Analysis and Design	3		✓	a1-a4,a6-a9,b1-b4,c1-c6,d1-d5
IT101	IT Fundamentals	3	✓		a1-a6,a8,a9,b1-b3,c1-c4,d1-d4
IT251	Data Communications	3	✓		a1-a7,b1-b6,c1-c5,d1-d6
IT351	Computer Networks	3	✓		a1-a10,a17,b1-b5,c1-c7,d1-d9
IT371	Web Programming	3		✓	a1-a8,b1-b3,c1-c5,d1-d7

MM301	Introduction to Multimedia Technology	3	✓		a1 , a2,a3 , b1-b4,c1,c2, c3-c7 , d1-d9
CE221	Computer Architecture	3	✓		a1-a6,b1-b5,c1-c6,d1-d5
Subtotal			36	6	
Total			42		

6d. Applied Computing Sciences (specialization) and Institution character-identifying subjects

	Code	Course Name	Credit	Achieved ILOs
Compulsory Courses	MM302	Introduction to Digital Video	3	a1-a6,b1-b5,c1-c6,d1-d5
	MM321	3D Modeling and Animation	3	a1 , a2,a3 , b1-b4,c1,c2, c3-c7 , d1-d9
	MM401	Interactive Multimedia Development	3	a1-a6,b1-b5,c1-c6,d1-d5
	MM411	Virtual Reality	3	a1 , a2,a3 , b1-b4,c1,c2, c3-c7 , d1-d5
	CS451	Computer Animation	3	a1-a4,b1-b3,c1-c4,d1-d4
	CS452	Computer Vision	3	a1-a3,b1-b4,c1-c3,d1-d5
		Subtotal	18	
Elective Courses*	MM402	Scripting and Storyboarding	3	a1 , a2,a3 , b1-b4,c1,c2, c3-c7 , d1-d9
	MM403	Digital Sound	3	a1-a6,b1-b5,c1-c6,d1-d5
	MM412	Human Computer Interaction	3	a1 , a2,a3 , b1-b4,c1,c2, c3-c7 , d1-d5
	MM421	3D Photography and Geometry Processing	3	a1 , a2,a3 , b1-b4,c1,c2, c3-c7 , d1-d9
	MM422	Principles of 2D Animation	3	a1-a3,b1-b6,c1,c2,d1-d6
	CS352	Image Processing	3	a1-a3,b1-b6,c1,c2,d1-d6
	CS453	Game Programming	3	a1-a4 , b1,b3,b5 , c1-c6 , d1-d6
	CS353	Advanced Computer Graphics	3	a1-a3,b1-b6,c1,c2,d1-d6
	CS463	Pattern Recognition	3	a1-a3,b1-b6,c1,c2,d1-d6
	CS471	Introduction to Computer Security	3	a1-a3,b1-b6,c1,c2,d1-d6
	IS417	Multimedia Databases	3	a1-a8,b1-b5,c1-c5,d1,d2
IT371	Web Programming	3	a1-a8,b1-b5,c1-c5,d1,d2	
		Subtotal	24	
		Total	42	
Student select only 8 courses				

6e. Training and Projects

Code	Course Name	Credit	Achieved ILO's
IS221	Project Management	2	a4, a5,a7, a8, a11,a13,a14 b2, b5, b10, b12, c5, c10, c13 d1-d4, d8,d14
CS381	Software Development and Professional Practice	3	a1-a8,b1-b5,c1-c5,d1,d2
MM331	Field Training	3	a1 , a2,a3 , b1-b4,c1,c2, c3-c7 , d1-d5
MM431	Capstone Project I	3	a4, a5,a7, a8, a11,a13,a14 b5, b12, b15, b17 c3, c10 d1-d4, d8
MM432	Capstone Project II	3	a5,a7, a8, a11,a14 b2, b5, b10, b12, b15, ,b17 c3, c5, c7,c10, c13 d1-d4
	Total	14	

7. Course Levels

1 st Level Courses								
Code	Course	Credits	Prerequisites	Type		Teaching Hours		
				R	E	L	T	P
CS141	Programming Fundamentals	3	IT101	✓		3		3H ^T
IT101	IT Fundamentals	3	-	✓		3		3 H ^T
MATH101	Mathematics I	3	-	✓		3	2	
MATH102	Mathematics II	3	MATH101	✓		3	2	
PHYS101	Physics I	3	-	✓		2		2 H ^S
PHYS102	Physics II	3	-	✓		2		2 H ^S
EE101	Electronics	3	-	✓		2		2 H ^S
EE102	Digital Circuits	2	EE101	✓		2		2 H ^S
HUM111	English Language I	2	-	✓		2		
HUM112	English Language II	2	HUM111		✓	2		
HUM121	Social Context of Computing	1	-	✓		1		
HUM122	Intellectual Property	1	-		✓	1		
HUM131	Organizational Behavior	2	-		✓	2		
HUM132	Interpersonal Communication	2	-	✓		2		
HUM133	Computing Economics	2	-		✓	2		
HUM141	Computer Law	2	-		✓	2		
HUM142	Privacy and Civil Liberties	1	-		✓	1		
HUM151	Hand Drawing	2	-		✓	1		3 H ^S
HUM152	History of Computing	2	-		✓	2		
HUM153	Islamic Culture	1	-		✓	1		
HUM154	Scientific Thinking	1	-		✓	1		
Subtotal						28	8	

Total	36
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2 nd Level Courses								
Code	Course	Credits	Prerequisites	Type		Teaching Hours		
				R	E	L	T	P
CS201	Discrete Structures	3	MATH102	✓		3	2	
CS211	Data Structures and Algorithms	3	CS241	✓		3		2 H ^T
CS241	Object-Oriented Programming	3	CS141	✓		3		2 H ^T
IS201	Foundations of Information Systems	3	IT101		✓	2		2 H ^T
IS211	File Organization	3	CS241		✓	2		2 H ^T
IS212	Databases	3	IS201	✓		3		2 H ^T
IS221	Project Management	2	IT101	✓		2		2 H ^O
IS231	Systems Analysis and Design	3	IT101		✓	3	2	
IT251	Data Communications	3	IT101	✓		3	2	
CE221	Computer Architecture	3	CS141, CS201	✓		3		2 H ^T
MATH201	Mathematics III	3	MATH102		✓	3	2	
MATH202	Probability and Statistics	2	MATH102	✓		2		2 H ^T
EE201	Digital Signal Processing	3	MATH201		✓	3		2 H ^T
HUM231	Business Administration	2	-	✓		2		
HUM232	Technical Writing	2	HUM111	✓		2		2 H ^O
HUM241	Computers and Ethics	1	-	✓		1		
Subtotal				27	0-12			
Total				27-39				

3 rd Level Courses								
Code	Course	Credits	Prerequisites	Type		Teaching Hours		
				R	E	L	T	P
CS301	Operation Research	3	CS201		✓	3		2 H ^T
CS302	Simulation and Modeling	3	MATH202		✓	3		2 H ^T
CS321	Operating Systems	3	CE221	✓		3		2 H ^T
CS341	Visual Programming	3	CS211		✓	3		2 H ^T
CS351	Computer Graphics	3	IT101, CS201	✓		3		2 H ^T
CS352	Image Processing	3			✓	3		2 H ^T
CS353	Advanced Computer Graphics	3	CS352		✓	3		2 H ^O
CS361	Artificial Intelligence	3	IT101, CS201		✓	3		2 H ^T
CS381	Software Development and Professional Practice	3	CS211, CS391	✓		3		3 H ^O
CS391	Software Engineering	3	CS211	✓		3	2	
IT351	Computer Networks	3	IT251, CE221	✓		3		2 H ^T
MM301	Introduction to Multimedia Technology	3	CS241	✓		3		2 H ^T
MM302	Introduction to Digital Video	3	CS241, MATH202	✓		3		2 H ^T
MM321	3D Modeling and Animation	3	IT101	✓		1		6 H ^S
MM331	Field Training	3	IS221	✓				
MATH301	Numerical Analysis	3	MATH102		✓	3	2	

Subtotal	27	0-15	
Total	27-42		

4 th Level Courses								
Code	Course	Credits	Prerequisites	Type		Teaching Hours		
				R	E	L	T	P
MM401	Interactive Multimedia Development	3	MM301	✓		3		2 H ^T
MM402	Scripting and Storyboarding	3	MM301		✓	3		2 H ^T
MM403	Digital Sound	3	MM301		✓	3		2 H ^T
MM411	Virtual Reality	3	CS352	✓		3		3
MM412	Human Computer Interaction	3	CS341		✓	3		2 H ^T
MM421	3D Photography and Geometry Processing	3	MM301		✓	3		2 H ^T
MM431	Capstone Project I	3	CS381, IS221	✓		1		4 H ^S
MM432	Capstone Project II	3	CS381, IS221	✓		1		4 H ^S
MM422	Principles of 2D Animation	3	MM301		✓	3		2 H ^T
CS451	Computer Animation	3	CS352	✓		3		2 H ^T
CS452	Computer Vision	3	CS241, PHYS102	✓		3		2 H ^T
CS471	Introduction to Computer Security	3	CS211, IT351		✓	3		2 H ^O
CS463	Pattern Recognition	3	CS361		✓	3		2 H ^O
CS453	Game Programming	3	MM301		✓	3		2 H ^O
IS417	Multimedia Databases	3	IS212, CS241		✓	3		2 H ^O
IT371	Web Programming	3	CS141, IT251		✓	3		2 H ^T
Subtotal				18	18-24			
Total				36-42				

8. Contents of Courses

Syllabus: See the below

9. Program Admission Requirements

High score in secondary school education certificate in (Mathematical Section).

10. Regulations for progression and program completion

Please, refer to faculty bylaw (Curriculum of Undergraduate Programs), 2011.

11. 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

12. Program Evaluation

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

MM Program
Matrices



MM Undergraduate Program Matrices

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

1. Academic Standards Matrix

This matrix shows the ILOs invoked in MM Program Specifications and those existing in NARS and the corresponding between them.

2. Program Matrix I (Courses - NARS General)

This matrix shows how MM Program Courses can cover the NARS general ILOs.

3. Program Matrix II (Courses - NARS Special)

This matrix shows how MM Program Courses can cover the NARS special ILOs.

4. Program Matrix III (Courses - Knowledge and Understanding Skills)

This matrix shows how MM Program Courses can cover Knowledge and Understanding Skills invoked in MM Program Specifications.

5. Program Matrix IV (Courses - Intellectual Skills)

This matrix shows how MM Program Courses can cover Intellectual Skills invoked in MM Program Specifications.

6. Program Matrix V (Courses - Professional and Practical Skills)

This matrix shows how MM Program Courses can cover Professional and Practical Skills invoked in MM Program Specifications.

7. Program Matrix VI (Courses - Transferable Skills)

This matrix shows how MM Program Courses can cover Transferable Skills invoked in MM Program Specifications.

8. Program Matrix VII (Aims - ILOs)

This matrix shows how MM Program ILOs can cover the program aims.

9. Teaching and Learning Methods Matrix VIII (ILOs-Teaching and Learning Methods)

This matrix shows what teaching methods are covered by MM Program ILOs.

10. Assessment Methods Matrix VIII (ILOs-Assessment Methods)

This matrix shows what assessment methods are covered by MM Program ILOs

Academic Standards (Knowledge and Understanding Skills)(October2010)

MM Program ILOs	Corresponding in NARS		NARS ILOs - General	NARS ILOs - Special
a1. Understand the essential mathematics relevant to computer science and multimedia.		A1	K1. Knowledge and understanding of essential facts, concepts, principles, theories and practices that underpin computing as an academic discipline. K2. Knowledge of the tools, practices and methodologies used in the specification, design, implementation and critical evaluation of computer software systems. K3. Knowledge of the methods used in defining and assessing criteria for measuring the extent to which a computer system is appropriate for its current deployment and future evolution. K4. Knowledge and understanding of the current and underlying technologies that support computer processing and inter-computer communication. K5. Knowledge and understanding of the principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results. K6. Knowledge of business and management principles relevant to computing K7. Knowledge of the professional, legal, moral and ethical issues relevant to the computing industry.	A1. Understand the essential mathematics relevant to computer science. A2. Use high-level programming languages. A3. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics. A4. Interpreting and analyzing data qualitatively and/or quantitatively. A5. Know and understand the principles and techniques of a number of application areas informed by the research directions of the subject, such as artificial intelligence, databases and computer graphics. A6. Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition. A7. Understanding of fundamental topics in Computer Science, including hardware and software architectures, software engineering principles and methodologies, operating systems and software tools.
a2. Understand high-level programming languages.		A2		
a3. Demonstrate basic knowledge and understanding of a core of mathematical analysis, algebra, applied mathematics and statistics.		A3		
a4. Interpret data qualitatively and/or quantitatively.		A4		
a5. Know and understand the principles and techniques of a number of application areas informed by the research directions of multimedia.		A5		
a6. Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition, computer vision and Human computer Interaction.	K8	A6		
a7. Understand the fundamental topics in computer systems, including hardware architectures and operating systems.	K1	A7		
a8. Select advanced topics to provide a deeper understanding of some aspects of object-oriented analysis and design, and software engineering.	K1	A8		
a9. Select advanced topics to provide a deeper understanding of some aspects of the artificial intelligence, image processing, and computer graphics and animation.	K1	A8		
a10. Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems.	K1	A7		
a11. Provide a deeper understanding of legal, professional and moral aspects of the exploitation of computing..	K7			

MM Program ILOs	Corresponding in NARS		NARS ILOs - General	NARS ILOs - Special
a12. Know the tools, practices and methodologies used in the specification, design, implementation and critical evaluation of multimedia systems.	K2	A7	K8. Knowledge of developments in research fields across a range of knowledge areas	A8. Select advanced topics to provide a deeper understanding of some aspects of the subject, such as hardware systems design, object-oriented analysis and design, and artificial intelligence, and parallel and concurrent computing.
a13. Know the methods used in defining and assessing criteria for measuring the extent to which a computer system is appropriate for its current deployment and future evolution.	K3			
a14. Know the current and underlying technologies that support computer processing and inter-computer communication.	K4			
a15. Understand of the principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results.	K5			

Academic Standards (Intellectual Skills)

MM Program ILOs	Corresponding in NARS		NARS ILOs – General	NARS ILOs - Special
b1. Discuss traditional and nontraditional problems, set goals towards solving them, and observe results..		B1	I1. Analyze a wide range of problems and provide solutions related to the design and construction of computing systems through suitable algorithms, structures, diagrams, and other appropriate methods. I2. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline. I3. Understand and analyze problems and evaluate computer software systems for their solution. I4. Define and assess criteria to measure the appropriateness of a computer system for its current deployment and future evolution, and to interpret the results thereof. I5. Analyze, propose and evaluate alternative computer systems and processes taking into account limitations, constraints, fit-for-purpose, general quality, and possible trade-offs within the parameters of the problem. I6. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences. I7. Generate and evaluate the results of tests to investigate the functionality of computer systems.	B1. Define traditional and nontraditional problems, set goals towards solving them, and observe results. B2. Perform comparisons between (algorithms, methods, techniques...etc). B3. Perform classifications of (data, results, methods, techniques, algorithms.. etc.). B4. Identify attributes, components, relationships, patterns, main ideas, and errors. B5. Summarize the proposed solutions and their results. B6. Restrict solution methodologies upon their results. B7. Establish criteria, and verify solutions. B8. Identify a range of solutions and critically evaluate and justify proposed design solutions. B9. Solve computer science problems with pressing
b2. Compare between (methods, techniques...etc).		B2		
b3. Apply classifications of (data, results, methods, techniques.. etc.).		B3		
b4. Analyze attributes, components, relationships, patterns, main ideas, and errors.		B4		
b5. Summarize the proposed solutions and their results.		B5		
b6. Restrict solution methodologies upon their results.		B6		
b7. Establish criteria, and verify solutions.		B7		
b8. Show a range of solutions and critically evaluate and justify proposed design solutions.		B8		
b9. Analyze computer science problems with pressing commercial or industrial constraints.		B9		
b10. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.		B10		
b11. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application).				
b12. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline.	I3, I8			
b13. Apply knowledge and methods from a variety of sources	I5			

b14. Analyze requirements of information manipulation and communication problems and design solutions based around appropriate integration of multimedia, Internet and computer software technologies	I1		I8. Reach computing judgments considering balanced costs, benefits, safety, quality, reliability, and environmental impact.	commercial or industrial constraints. B10. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.
b15. Plan, conduct and report on a program of work covering multiple system lifecycle stages and leading to an end-product, with evaluation of the end-product, and the process and technologies employed.	I2		I9. To be guided by the professional, legal, moral and ethical issues relevant to the computing industry.	
b16. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences.	I4		I10. Read and evaluate research papers in a range of knowledge areas.	
b17. Correlate the results of tests to investigate the functionality of computer systems.	I6			

Academic Standards (Professional and Practical Skills)

MM Program ILOs	Corresponding in NARS		NARS ILOs - General	NARS ILOs - Special
c1. Use appropriate programming languages and design methodologies.		C1	P1. Operate computing equipment effectively, recognizing its logical and physical properties, capabilities and limitations. P2. Effectively deploy computers to solve practical problems. P3. Deploy effectively the knowledge and tools used for the construction and documentation of computer applications. P4. Work effectively individually, under direct supervision and/or as part of a team.	C1. Use appropriate programming languages, web-based systems and tools, design methodologies, and database systems. C2. Communicate effectively by oral, written and visual means. C3. Perform independent information acquisition and management, using the scientific literature and Web sources. C4. Prepare and present seminars to a professional standard. C5. Perform independent information acquisition and management, using the scientific literature and Web sources. C6. Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy. C7. Specify, design, and implement computer-based systems. C8. Evaluate systems in terms of general quality attributes and possible tradeoffs presented within the given problem.
c2. Use appropriate web-based systems, tools and design methodologies.		C1		
c3. Specify, design, and implement computer-based systems.		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.		C3		
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.	P2	C7		
c6. Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on		C8		

understanding the whole process involved in using computers to solve practical problems.			<p>P5. Use an appropriate mix of tools and aids in preparing and presenting reports for a range of audiences, including management, technical, users or the academic community.</p> <p>P6. Commercialize knowledge and skills to computing community and industry.</p> <p>P7. Assess the implications, risks or safety aspects involved in the operation of computing equipment within a specific context.</p> <p>C9. Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video.</p> <p>C10. Apply the principles of human-computer interaction to the evaluation and construction of a wide range of materials including user interfaces, web pages, and multimedia systems.</p> <p>C11. Identify any risks or safety aspects that may be involved in the operation of computing equipment within a given context.</p> <p>C12. Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems.</p> <p>C13. Prepare technical reports, and a dissertation, to a professional standard.</p>
c7. Make effective use of general computing facilities, plan and manage a project to complete within budget and schedule.		C9	
c8. Manage the need for continuing professional development in recognition of the need for lifelong learning.		C10	
c9. Operate computing equipment efficiently, taking into account its logical and physical properties.	P7	C11	
c10. Apply tools and techniques for the design and development of applications.	P3	C12	
c11. Apply Internet technology	P1		
c12. Prepare technical reports and presentations		C3	
c13. Use appropriate diagrammatic and formal written notations in design work and in reports	I9		
c14. Use a programming language and a variety of software tools and environments to construct, test and document software applications, which may include multimedia components.	P1		
c15. Use multimedia production systems	I10		
c16. Apply software engineering and application technologies to achieve effective communication and interaction with end users.	P2		

Academic Standards (Transferable Skills)

MM Program ILOs	Corresponding in NARS		NARS ILOs - General	NARS ILOs - Special
d1. Communicate effectively by oral, written and visual means.	T6	C2	<p>T1. Demonstrate the ability to make use of a range of learning resources and to manage one's own learning.</p> <p>T2. Demonstrate efficient skills in team management, time management and organizational skills.</p> <p>T3. Show effective information-retrieval.</p> <p>T4. Work in stressful environment and within constraints, cope with multiple tasks.</p> <p>T5. Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension.</p> <p>T6. Exhibits communication skills, public speaking and Presentation skills, and delegation, writing skills, oral delivery, and effectively using various media for a variety of audiences.</p> <p>T7. Display effective use of general computing facilities.</p> <p>T8. Develop a range of fundamental research skills, through the use of online resources, technical repositories and library-based material.</p> <p>T9. Demonstrate an appreciation of the need to continue professional development in recognition of the requirement for Life Long Learning.</p>	-
d2. Work effectively as an individual and as a member of a team.	T2			
d3. Collaborate effectively within multidisciplinary team.	P4			
d4. Work in stressful environment and within constraints.	T4			
d5. Prepare and present seminars to a professional standard.	P5	C4		
d6. Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy.		C6		
d7. Demonstrate efficient IT capabilities.	T3, T7			
d8. Lead and motivate individuals.				
d9. Manage tasks and resources.	T2			
d10. Search for information and adopt life-long self-learning.	T3, T9	C5		
d11. Acquire entrepreneurial skills.	P6			
d12. Manage one's own learning and development.	T1, T9			
d13. Prepare their work in the form of reports.	P5	C13		

d14. Communicate effectively with team members, managers and costumers.	T6	C2		
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				Intellectual Skills			
NARS ILOs General	Covering ILOs in MM Program	NARS ILOs Special	Covering ILOs in MM Program	NARS ILOs General	Covering ILOs in MM Program	NARS ILOs Special	Covering ILOs in MM Program
K1	a7, a8, a9, a10	A1	a1	I1	b14	B1	b1
K2	a12	A2	a2	I2	b15	B2	b2
K3	a13	A3	a3	I3	b12	B3	b3
K4	a14	A4	a4	I4	b16	B4	b4
K5	a15	A5	a5	I5	b13	B5	b5
K6		A6	a6	I6	b16	B6	b6
K7	a11	A7	a7,a10, a12	I7	b16	B7	b7
K8	a6	A8	a8, a9	I8	b11	B8	b8
				I9	c13	B9	b9
				I10	c15	B10	b10

Professional and Practical Skills

NARS ILOs General	Covering ILOs in CS Program	NARS ILOs Special	Covering ILOs in CS Program
P1	c11, c14	C1	c1, c2, c3
P2	c5, c16	C2	d1, d14
P3	c10	C3	c4, c12
P4	d3		
P5	d5, d13	C4	d5
P6	d11	C5	d10
P7	c9	C6	d6
		C7	c5
		C8	c6
		C9	c7
		C10	c8
		C11	c9
		C12	c10
		C13	d13

Transferable skills

NARS ILOs General	Covering ILOs in CS Program
T1	d12
T2	d2, d9
T3	d7, d10
T4	d4
T5	d15
T6	d1, d14
T7	d7
T8	d16
T9	d10, d12

MM Program Courses

	Course Code	Course Title	Type					Type	
			E	R				E	R
1st Level	CS141	Programming Fundamentals			3rd Level	CS301	Operation Research	✓	
	IT101	IT Fundamentals				CS302	Simulation and Modeling	✓	
	MATH101	Mathematics I				CS321	Operating Systems		✓
	MATH102	Mathematics II				CS341	Visual Programming	✓	
	PHYS101	Physics I				CS351	Computer Graphics		✓
	PHYS102	Physics II				CS352	Image Processing	✓	
	EE101	Electronics				CS353	Advanced Computer Graphics	✓	
	EE102	Digital Circuits				CS381	Software Development and Professional Practice		✓
	HUM111	English Language I				CS391	Software Engineering		✓
	HUM112	English Language II				IT351	Computer Networks		✓
	HUM121	Social Context of Computing				MM301	Introduction to Multimedia Technology		✓
	HUM122	Intellectual Property				MM302	Introduction to Digital Video		✓
	HUM131	Organizational Behavior				MM321	3D Modeling and Animation		✓
	HUM132	Interpersonal Communication				MM331	Field Training		✓
	HUM133	Computing Economics				MATH301	Numerical Analysis	✓	
	HUM141	Computer Law				MM401	Interactive Multimedia Development		✓
	HUM142	Privacy and Civil Liberties				MM402	Scripting and Storyboarding	✓	
	HUM151	Hand Drawing				MM411	Virtual Reality		✓
HUM152	History of Computing			MM412	Human Computer Interaction	✓			
HUM153	Islamic Culture			MM421	3D Photography and Geometry Processing	✓			
HUM154	Scientific Thinking			MM431	Capstone Project I		✓		
2nd Level	CS201	Discrete Structures		✓	MM432	Capstone Project II		✓	
	CS211	Data Structures and Algorithms		✓	MM422	Principles of 2D Animation	✓		
	CS241	Object-Oriented Programming		✓	CS451	Computer Animation		✓	
	IS201	Foundations of Information Systems	✓		CS452	Computer Vision		✓	
	IS211	File Organization	✓		CS471	Introduction to Computer Security	✓		
	IS212	Databases		✓	CS463	Pattern Recognition	✓		
	IS221	Project Management		✓	CS453	Game Programming	✓		
	IS231	Systems Analysis and Design	✓		IS417	Multimedia Databases	✓		
	IT251	Data Communications		✓	IT371	Web Programming	✓		
	CE221	Computer Architecture		✓					

	Course Code	Course Title	Type					Type	
			E	R				E	R
	MATH201	Mathematics III	✓						
	MATH202	Probability and Statistics		✓					
	EE201	Digital Signal Processing	✓						
	HUM231	Business Administration		✓					
	HUM232	Technical Writing		✓					
	HUM241	Computers and Ethics		✓					

Program Matrix I (Courses - NARS General)

		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																				✓						✓	✓	✓		✓				✓			
	MATH10																				✓							✓										
	MATH10									✓											✓						✓											
	PHYS101									✓												✓	✓	✓			✓		✓						✓			
	PHYS102																								✓		✓	✓		✓						✓		
	EE101	✓	✓												✓												✓	✓					✓			✓		
	EE102	✓																									✓	✓	✓					✓			✓	
	HUM111																					✓																
	HUM112	✓						✓			✓										✓			✓			✓							✓				
	HUM121						✓														✓			✓	✓		✓				✓							
	HUM122						✓	✓													✓			✓			✓							✓				
	HUM131		✓									✓										✓						✓	✓	✓		✓	✓					
	HUM132	✓							✓														✓	✓				✓	✓	✓		✓	✓					
	HUM133	✓																				✓	✓				✓	✓		✓								
	HUM141				✓									✓								✓	✓					✓		✓								
	HUM142																					✓							✓					✓				
	HUM151							✓															✓		✓	✓		✓	✓				✓	✓	✓			
	HUM152	✓										✓										✓	✓				✓	✓					✓	✓				
HUM153												✓									✓					✓	✓	✓	✓				✓			✓		
HUM154	✓	✓										✓									✓	✓				✓	✓	✓	✓				✓			✓		
2nd Level	CS201																				✓							✓					✓					
	CS211																					✓							✓									
	CS241							✓																	✓			✓										
	IS201	✓	✓								✓	✓		✓								✓	✓				✓							✓				
	IS211	✓	✓			✓	✓				✓	✓	✓									✓					✓		✓	✓	✓			✓			✓	
	IS212								✓													✓						✓		✓						✓	✓	
	IS221									✓												✓						✓						✓				
	IS231																					✓	✓				✓	✓		✓	✓		✓	✓				
	IT251	✓					✓		✓	✓	✓		✓									✓		✓	✓		✓	✓	✓				✓				✓	
	CE221	✓										✓		✓	✓							✓		✓	✓		✓	✓							✓		✓	
	MATH20																								✓			✓	✓					✓	✓			
	MATH20		✓									✓											✓					✓	✓						✓	✓		
	EE201																						✓					✓	✓					✓	✓			
	HUM231	✓						✓			✓		✓									✓					✓	✓						✓	✓			
	HUM232					✓																✓					✓	✓		✓	✓				✓	✓		✓
HUM241			✓										✓										✓			✓		✓	✓					✓	✓			
3rd Level	CS301										✓											✓						✓										
	CS302	✓							✓														✓	✓				✓	✓	✓				✓	✓			
	CS321																																					
	CS341								✓														✓					✓										
	CS351	✓	✓																				✓						✓									
	CS352																						✓					✓	✓	✓					✓			✓
	CS353			✓									✓													✓		✓		✓					✓			
	CS381									✓																✓		✓	✓					✓	✓			
	CS391	✓																											✓	✓					✓			
	IT351	✓							✓													✓	✓	✓	✓		✓	✓		✓	✓				✓		✓	
	MM301	✓	✓				✓		✓				✓	✓														✓	✓					✓	✓			✓
	MM302	✓	✓			✓		✓														✓		✓				✓	✓						✓	✓		✓
MM321	✓	✓			✓	✓				✓	✓														✓	✓	✓										✓	

Program Matrix II (Courses – NARS Special)

		A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C15			
1st Level	CS141	✓								✓										✓							✓	✓	✓					
	IT101																			✓						✓	✓	✓	✓					
	MATH101																				✓							✓						
	MATH102									✓											✓						✓	✓						
	PHYS101									✓													✓	✓	✓		✓	✓						
	PHYS102																								✓		✓	✓	✓		✓			
	EE101	✓	✓												✓												✓	✓						
	EE102	✓																									✓	✓	✓					
	HUM111																					✓												
	HUM112	✓							✓		✓							✓			✓			✓	✓		✓	✓						
	HUM121							✓													✓				✓	✓		✓				✓		
	HUM122							✓	✓												✓					✓		✓						
	HUM131		✓									✓										✓						✓	✓	✓				
	HUM132	✓								✓														✓	✓			✓	✓	✓				
	HUM133	✓																			✓	✓				✓	✓		✓	✓				
	HUM141				✓								✓				✓				✓	✓						✓	✓					
	HUM142																					✓							✓					
	HUM151								✓														✓		✓	✓		✓	✓					
	HUM152	✓											✓						✓			✓	✓				✓	✓	✓					
	HUM153												✓									✓					✓	✓	✓	✓				
HUM154	✓	✓										✓									✓	✓				✓	✓	✓	✓	✓				
2nd Level	CS201																				✓							✓						
	CS211																					✓							✓					
	CS241								✓																	✓		✓	✓					
	IS201	✓	✓								✓	✓	✓		✓							✓	✓				✓	✓						
	IS211	✓	✓			✓	✓			✓	✓	✓										✓					✓	✓	✓					
	IS212								✓													✓					✓	✓						
	IS221									✓												✓						✓						
	IS231																					✓	✓			✓		✓	✓	✓		✓		
	IT251	✓					✓		✓	✓	✓	✓					✓				✓		✓	✓	✓	✓	✓	✓	✓	✓				
	CE221	✓									✓		✓	✓								✓		✓	✓	✓	✓	✓	✓					
	MATH20111																									✓		✓	✓					
	MATH2022		✓								✓												✓			✓		✓	✓					
	EE201																					✓				✓		✓	✓					
	HUM231	✓						✓		✓	✓											✓				✓	✓	✓	✓					
HUM232				✓																		✓			✓	✓	✓	✓	✓					
HUM241			✓									✓												✓		✓	✓	✓	✓					
3rd Level	CS301										✓											✓						✓						
	CS302	✓							✓														✓	✓				✓	✓	✓				
	CS321																											✓						
	CS341								✓												✓			✓				✓						
	CS351	✓	✓																			✓						✓						
	CS352																					✓						✓	✓	✓				
	CS353			✓								✓															✓	✓	✓					
	CS381								✓																	✓		✓	✓					
	CS391	✓																												✓	✓			
	IT351	✓							✓							✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
	MM301	✓	✓	✓					✓	✓	✓							✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				

Program Matrix III (Courses - Knowledge and Understanding Skills)

	Course	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15		
1st Level	CS141	✓	✓			✓	✓	✓	✓	✓								
	IT101	✓	✓	✓	✓	✓	✓		✓	✓								
	MATH101	✓	✓															
	MATH102	✓	✓	✓	✓	✓												
	PHYS101	✓	✓	✓	✓	✓	✓											
	PHYS102	✓	✓	✓	✓	✓	✓	✓										
	EE101	✓	✓	✓	✓	✓												
	EE102	✓	✓	✓	✓	✓	✓	✓	✓									
	HUM111	✓																
	HUM112	✓	✓															
	HUM121	✓	✓	✓														
	HUM122	✓	✓															
	HUM131	✓	✓															
	HUM132	✓	✓	✓														
	HUM133	✓	✓	✓	✓	✓	✓											
	HUM141	✓	✓	✓	✓	✓												
	HUM142	✓	✓	✓	✓	✓												
	HUM151	✓	✓	✓	✓													
	HUM152		✓		✓	✓	✓				✓							
	HUM153	✓	✓	✓														
HUM154	✓	✓																
2nd Level	CS201	✓	✓															
	CS211	✓	✓	✓	✓	✓												
	CS241	✓	✓	✓	✓	✓												
	IS201	✓	✓	✓	✓	✓	✓	✓										
	IS211	✓	✓	✓	✓	✓												
	IS212	✓	✓															
	IS221	✓	✓	✓														
	IS231	✓	✓															
	IT251	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	CE221	✓	✓	✓	✓	✓	✓	✓	✓									
	MATH201	✓	✓															
	MATH202	✓	✓	✓	✓	✓												
	EE201	✓	✓	✓	✓	✓	✓	✓										

	HUM231	✓	✓	✓												
	HUM232	✓		✓	✓	✓	✓									
	HUM241	✓	✓	✓	✓											
3 rd Level	CS301	✓	✓	✓	✓	✓	✓	✓	✓							
	CS302	✓	✓	✓	✓	✓	✓									
	CS321	✓	✓	✓	✓	✓	✓	✓								
	CS341	✓	✓	✓	✓	✓	✓	✓	✓							
	CS351	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	CS352	✓	✓	✓	✓	✓										
	CS353	✓	✓	✓	✓											
	CS381	✓	✓	✓	✓	✓	✓	✓								
	CS391	✓	✓	✓	✓	✓	✓									
	IT351	✓	✓	✓												
	MM301	✓	✓	✓						✓		✓				✓
	MM302	✓		✓	✓						✓	✓	✓		✓	
	MM321					✓			✓		✓		✓		✓	✓
	MM331							✓	✓	✓	✓	✓				
	MATH301	✓	✓	✓		✓	✓	✓								
	4 th Level	MM401							✓		✓	✓	✓	✓	✓	✓
MM402								✓		✓	✓					
MM403					✓	✓	✓					✓	✓	✓	✓	
MM411								✓	✓	✓	✓	✓	✓	✓	✓	
MM412						✓	✓	✓	✓	✓	✓	✓	✓	✓		
MM421								✓		✓	✓	✓	✓	✓	✓	
MM431						✓		✓								
MM432				✓	✓	✓		✓								
MM422						✓	✓	✓	✓	✓						
CS451						✓			✓		✓		✓		✓	✓
CS452																
CS471		✓	✓	✓		✓	✓	✓								
CS463									✓		✓	✓	✓	✓	✓	
CS453									✓		✓	✓				
IS417						✓	✓	✓					✓	✓	✓	✓
IT371									✓	✓	✓	✓	✓	✓	✓	✓
		a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15

Program Matrix IV (Courses - Intellectual Skills)

	Course	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17
1st Level	CS141	✓	✓	✓	✓	✓												
	IT101	✓	✓	✓														
	MATH101	✓	✓	✓	✓	✓	✓											
	MATH102	✓	✓	✓	✓	✓	✓											
	PHYS101	✓	✓	✓	✓													
	PHYS102	✓	✓	✓	✓													
	EE101	✓	✓	✓	✓	✓	✓											
	EE102	✓	✓	✓	✓	✓	✓											
	HUM111	✓	✓															
	HUM112	✓	✓	✓														
	HUM121	✓	✓	✓														
	HUM122	✓	✓	✓														
	HUM131	✓	✓															
	HUM132	✓	✓	✓														
	HUM133	✓	✓	✓	✓	✓												
	HUM141	✓	✓	✓	✓													
	HUM142	✓	✓	✓	✓													
	HUM151	✓			✓													
	HUM152	✓	✓	✓														
	HUM153		✓	✓														
HUM154	✓	✓																
2nd Level	CS201	✓	✓	✓	✓	✓	✓	✓	✓			✓						
	CS211	✓	✓	✓	✓	✓												
	CS241	✓	✓	✓	✓													
	IS201	✓	✓	✓	✓	✓												
	IS211	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	IS212	✓	✓	✓	✓	✓												
	IS221	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	IS231	✓	✓	✓	✓	✓	✓											
	IT251	✓	✓	✓														
	CE221	✓	✓	✓														
	MATH201	✓	✓	✓														
	MATH202	✓	✓	✓	✓													
	EE201	✓	✓	✓	✓													
	HUM231	✓	✓	✓	✓													
	HUM232	✓	✓	✓	✓	✓												
	HUM241	✓	✓	✓	✓	✓	✓											

3rd Level	CS301	✓	✓	✓	✓	✓	✓											
	CS302	✓	✓	✓	✓	✓	✓											
	CS321	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	CS341	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	CS351	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	CS352	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	CS353	✓	✓															
	CS381			✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	
	CS391			✓	✓	✓		✓	✓			✓	✓		✓	✓	✓	
	IT351			✓	✓	✓	✓	✓	✓	✓								
	MM301	✓		✓				✓			✓		✓	✓			✓	
	MM302	✓	✓	✓	✓	✓	✓	✓										
	MM321										✓				✓	✓		
	MM331											✓	✓			✓	✓	
MATH301		✓	✓	✓	✓	✓	✓											
4th Level	MM401						✓	✓	✓	✓	✓							
	MM402														✓	✓	✓	
	MM403											✓	✓	✓	✓	✓		
	MM411								✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MM412		✓	✓	✓	✓							✓	✓	✓	✓		
	MM421									✓	✓	✓	✓	✓	✓	✓		
	MM431					✓	✓	✓	✓									
	MM432			✓	✓	✓	✓					✓	✓	✓	✓			
	MM422	✓							✓									
	CS451				✓	✓	✓						✓	✓	✓			
	CS452									✓	✓	✓	✓					
	CS471		✓	✓	✓	✓												
	CS463										✓	✓	✓					
	CS453								✓	✓	✓	✓						
	IS417						✓	✓	✓	✓								
	IT371	✓				✓	✓	✓				✓						
		b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17

Program MatrixV (Courses - Professional and Practical Skills)

	Course	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12	c13	c14	c15	c16
1st Level	CS141	✓	✓	✓	✓	✓											
	IT101	✓	✓	✓	✓												
	MATH101	✓	✓	✓							✓	✓					
	MATH102	✓	✓	✓	✓						✓	✓	✓	✓			
	PHYS101	✓	✓	✓	✓	✓	✓					✓		✓			
	PHYS102				✓		✓							✓			
	EE101						✓							✓	✓	✓	
	EE102						✓	✓	✓		✓						
	HUM111	✓	✓	✓							✓						
	HUM112	✓	✓	✓													
	HUM121	✓	✓	✓													
	HUM122	✓	✓	✓													
	HUM131	✓	✓	✓	✓												
	HUM132	✓	✓	✓													
	HUM133	✓	✓	✓	✓												
	HUM141	✓	✓	✓													
	HUM142	✓	✓	✓													
	HUM151	✓	✓	✓													
	HUM152	✓	✓	✓	✓												
	HUM153	✓	✓	✓													
HUM154	✓																
2nd Level	CS201	✓	✓	✓	✓												
	CS211	✓	✓	✓	✓	✓	✓	✓									
	CS241	✓	✓	✓	✓												
	IS201	✓	✓	✓	✓	✓	✓		✓								
	IS211	✓	✓	✓	✓	✓	✓										
	IS212	✓	✓	✓	✓	✓	✓										
	IS221	✓															
	IS231	✓	✓	✓	✓	✓											
	IT251	✓	✓	✓	✓	✓											
	CE221	✓	✓	✓													
	MATH201	✓			✓												
	MATH202	✓	✓	✓	✓												
	EE201	✓			✓												
	HUM231	✓	✓	✓													

	HUM232	✓	✓	✓													
	HUM241	✓	✓														
3rd Level	CS301	✓	✓	✓	✓	✓	✓	✓									
	CS302	✓	✓	✓	✓	✓	✓										
	CS321	✓	✓	✓	✓	✓											
	CS341	✓	✓	✓	✓	✓	✓	✓									
	CS351	✓	✓														
	CS352	✓	✓	✓	✓	✓											
	CS353	✓	✓	✓	✓												
	CS381	✓															
	CS391	✓	✓	✓	✓	✓	✓	✓									
	IT351	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	MM301	✓				✓	✓		✓			✓		✓		✓	
	MM302							✓	✓	✓	✓	✓	✓				
	MM321	✓			✓											✓	✓
	MM331			✓	✓	✓	✓	✓	✓								
MATH301	✓	✓	✓	✓	✓	✓	✓	✓									
4th Level	MM401								✓	✓	✓		✓				
	MM402							✓	✓	✓	✓						
	MM403				✓	✓	✓	✓	✓	✓							
	MM411	✓	✓	✓	✓	✓									✓	✓	
	MM412	✓		✓	✓	✓	✓	✓	✓								
	MM421						✓	✓	✓	✓	✓	✓	✓				
	MM431			✓	✓	✓	✓										
	MM432		✓	✓	✓	✓	✓										
	MM422	✓	✓	✓	✓	✓	✓	✓									
	CS451		✓	✓	✓	✓	✓	✓									
	CS452								✓	✓	✓						
	CS471							✓	✓	✓	✓						
	CS463			✓	✓	✓	✓	✓	✓	✓							
	CS453		✓	✓	✓												
	IS417		✓	✓	✓	✓	✓	✓	✓								
	IT371	✓	✓	✓	✓	✓											
		c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12	c13	c14	c15	c16

Program Matrix VI (Courses - Transferable Skills)

Program Matrix VII (Aims - ILOs)

	Course	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11	d12	d13	d14	d15	d16	
1st Level	CS141	✓	✓	✓	✓	✓	✓											
	IT101	✓	✓	✓	✓													
	MATH101	✓	✓	✓														
	MATH102	✓	✓	✓														
	PHYS101	✓	✓	✓	✓	✓	✓											
	PHYS102				✓		✓	✓						✓	✓			
	EE101		✓		✓		✓	✓						✓	✓			
	EE102		✓		✓		✓	✓						✓	✓			
	HUM111	✓	✓	✓	✓	✓	✓	✓										
	HUM112	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	HUM121	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	HUM122	✓	✓	✓	✓	✓	✓	✓										
	HUM131	✓	✓	✓	✓	✓	✓	✓										
	HUM132	✓	✓	✓	✓	✓	✓	✓										
	HUM133	✓	✓	✓	✓	✓	✓	✓										
	HUM141	✓	✓	✓	✓	✓	✓	✓										
	HUM142	✓	✓	✓														
	HUM151	✓	✓	✓														
	HUM152	✓	✓	✓														
	HUM153	✓	✓	✓														
HUM154	✓	✓	✓															
2nd Level	CS201	✓	✓	✓	✓													
	CS211	✓	✓	✓	✓	✓	✓											
	CS241	✓	✓	✓	✓	✓	✓											
	IS201			✓	✓	✓	✓											
	IS211	✓	✓	✓	✓	✓	✓											
	IS212	✓		✓	✓	✓	✓											
	IS221		✓	✓	✓	✓	✓											
	IS231	✓	✓	✓	✓	✓	✓	✓	✓	✓								
	IT251	✓	✓	✓	✓	✓	✓											
	CE221	✓	✓	✓	✓													
	MATH201	✓	✓	✓	✓													

	MATH202	✓	✓	✓													
	EE201	✓	✓	✓	✓												
	HUM231	✓	✓	✓	✓	✓	✓	✓									
	HUM232	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	HUM241	✓	✓	✓	✓	✓	✓	✓									
3 rd Level	CS301							✓	✓	✓	✓						
	CS302		✓	✓	✓	✓	✓	✓	✓	✓	✓						
	CS321								✓	✓	✓	✓					
	CS341			✓	✓	✓	✓	✓	✓	✓	✓	✓					
	CS351								✓	✓	✓	✓					
	CS352											✓	✓	✓	✓		
	CS353						✓	✓	✓	✓	✓	✓	✓	✓	✓		
	CS381												✓	✓	✓	✓	
	CS391							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	IT351												✓	✓	✓	✓	
	MM301	✓	✓	✓	✓	✓	✓								✓	✓	✓
	MM302							✓			✓	✓	✓	✓	✓		
	MM321								✓	✓	✓	✓	✓	✓	✓		
	MM331																
MATH301				✓	✓	✓	✓	✓	✓	✓							
4 th Level	MM401	✓											✓	✓	✓	✓	
	MM402									✓	✓	✓	✓				
	MM403				✓	✓	✓	✓	✓	✓	✓	✓					
	MM411									✓	✓	✓	✓	✓	✓	✓	
	MM412				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MM421									✓	✓	✓	✓	✓	✓	✓	
	MM431		✓	✓	✓	✓											
	MM432	✓	✓	✓	✓	✓											
	MM422				✓	✓	✓	✓	✓	✓	✓	✓					
	CS451					✓	✓	✓	✓								
	CS452	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	CS471							✓	✓	✓	✓						
	CS463		✓	✓	✓	✓	✓	✓	✓	✓	✓						
	CS453							✓	✓	✓	✓						
	IS417								✓	✓	✓	✓					
	IT371						✓	✓	✓	✓	✓	✓					
		d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11	d12	d13	d14	d15	d16

Program Matrix (Courses -MM Programs)

	Course	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15
1st Level	CS141	✓	✓			✓	✓	✓	✓	✓						
	IT101	✓	✓	✓	✓	✓	✓		✓	✓						
	MATH101	✓	✓													
	MATH102	✓	✓	✓	✓	✓										
	PHYS101	✓	✓	✓	✓	✓	✓									
	PHYS102	✓	✓	✓	✓	✓	✓	✓								
	EE101	✓	✓	✓	✓	✓										
	EE102	✓	✓	✓	✓	✓	✓	✓	✓							
	HUM111	✓														
	HUM112	✓	✓													
	HUM121	✓	✓	✓												
	HUM122	✓	✓													
	HUM131	✓	✓													
	HUM132	✓	✓	✓												
	HUM133	✓	✓	✓	✓	✓	✓									
	HUM141	✓	✓	✓	✓	✓										
	HUM142	✓	✓	✓	✓	✓										
	HUM151	✓	✓	✓	✓											
HUM152		✓		✓	✓	✓				✓						
HUM153	✓	✓	✓													
HUM154	✓	✓														
2nd Level	CS201	✓	✓													
	CS211	✓	✓	✓	✓	✓										
	CS241	✓	✓	✓	✓	✓										
	IS201		✓	✓	✓			✓	✓				✓			
	IS211	✓				✓	✓				✓			✓	✓	
	IS212	✓	✓	✓	✓		✓		✓			✓		✓	✓	
	IS221	✓			✓		✓							✓		
	IS231	✓	✓		✓		✓			✓	✓		✓		✓	
	IT251	✓	✓	✓	✓	✓	✓	✓	✓							
	CE221	✓	✓	✓	✓	✓	✓	✓	✓							
	MATH201	✓	✓	✓												
	MATH202	✓	✓	✓	✓	✓										
	EE201	✓	✓	✓												
	HUM231	✓	✓	✓												

	HUM232	✓		✓	✓	✓	✓									
	HUM241	✓	✓	✓	✓											
3 rd Level	CS301	✓	✓	✓	✓	✓	✓	✓	✓							
	CS302	✓	✓	✓	✓	✓	✓									
	CS321	✓	✓	✓	✓	✓	✓	✓								
	CS341	✓	✓	✓	✓	✓	✓	✓	✓							
	CS351	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	CS352	✓	✓	✓	✓	✓										
	CS353	✓	✓	✓	✓											
	CS381	✓	✓	✓	✓	✓	✓	✓								
	CS391	✓	✓	✓	✓	✓	✓									
	IT351	✓	✓	✓												
	MM301	✓	✓	✓					✓			✓				✓
	MM302	✓		✓	✓						✓	✓	✓		✓	
	MM321					✓			✓		✓		✓		✓	✓
	MM331															
MATH301	✓	✓	✓		✓	✓	✓									
4 th Level	MM401							✓		✓	✓	✓	✓	✓	✓	
	MM402							✓		✓	✓					
	MM403				✓	✓	✓					✓	✓	✓	✓	
	MM411							✓	✓	✓	✓	✓	✓	✓	✓	✓
	MM412					✓	✓	✓	✓	✓	✓	✓	✓	✓		
	MM421							✓		✓	✓	✓	✓	✓	✓	✓
	MM431						✓					✓				✓
	MM432						✓	✓					✓	✓	✓	
	MM422					✓	✓	✓	✓	✓						
	CS451					✓			✓		✓		✓		✓	✓
	CS452															
	CS471	✓	✓	✓		✓	✓	✓								
	CS463								✓		✓	✓	✓	✓	✓	✓
	CS453								✓		✓	✓				
	IS417					✓	✓	✓					✓	✓	✓	✓
	IT371								✓	✓	✓	✓	✓	✓	✓	✓
		a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15

	Course	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17	
1st Level	CS141	✓	✓	✓	✓	✓													
	IT101	✓	✓	✓															
	MATH101	✓	✓	✓	✓	✓	✓												
	MATH102	✓	✓	✓	✓	✓	✓												
	PHYS101	✓	✓	✓	✓														
	PHYS102	✓	✓	✓	✓														
	EE101	✓	✓	✓	✓	✓	✓												
	EE102	✓	✓	✓	✓	✓	✓												
	HUM111	✓	✓																
	HUM112	✓	✓	✓															
	HUM121	✓	✓	✓															
	HUM122	✓	✓	✓															
	HUM131	✓	✓																
	HUM132	✓	✓	✓															
	HUM133	✓	✓	✓	✓	✓													
	HUM141	✓	✓	✓	✓														
	HUM142	✓	✓	✓	✓														
	HUM151	✓			✓														
	HUM152	✓	✓	✓															
	HUM153		✓	✓															
HUM154	✓	✓																	
2nd Level	CS201	✓	✓	✓	✓	✓	✓	✓	✓			✓							
	CS211	✓	✓	✓	✓	✓													
	CS241	✓	✓	✓	✓														
	IS201			✓		✓													
	IS211			✓		✓	✓				✓								
	IS212	✓			✓		✓		✓		✓								
	IS221				✓	✓		✓	✓		✓								
	IS231	✓		✓		✓		✓											
	IT251	✓	✓	✓															
	CE221	✓	✓	✓															
	MATH201	✓	✓	✓															
	MATH202	✓	✓	✓	✓														
	EE201	✓	✓	✓	✓														
	HUM231	✓	✓	✓	✓														
	HUM232	✓	✓	✓	✓	✓													
	HUM241	✓	✓	✓	✓	✓	✓												
	3rd Level	CS301	✓	✓	✓	✓	✓	✓											
		CS302	✓	✓	✓	✓	✓												

	CS321	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	CS341	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	CS351	✓																	
	CS352	✓	✓	✓	✓	✓	✓	✓	✓	✓									
	CS353	✓	✓																
	CS381			✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓			
	CS391			✓	✓	✓		✓	✓			✓	✓		✓	✓	✓		
	IT351			✓	✓	✓	✓	✓	✓	✓									
	MM301	✓		✓				✓			✓		✓	✓				✓	
	MM302	✓	✓	✓	✓	✓	✓	✓											
	MM321										✓				✓	✓			
	MM331		✓	✓	✓	✓	✓												
	MATH301		✓	✓	✓	✓	✓	✓											
4th Level	MM401						✓	✓	✓	✓	✓								
	MM402															✓	✓	✓	
	MM403											✓	✓	✓	✓	✓	✓		
	MM411									✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MM412		✓	✓	✓	✓									✓	✓	✓	✓	
	MM421										✓	✓	✓	✓	✓	✓	✓	✓	
	MM431					✓	✓	✓	✓										
	MM432			✓	✓	✓	✓					✓	✓	✓	✓				
	MM422	✓							✓										
	CS451				✓	✓	✓						✓	✓	✓				
	CS452										✓	✓	✓	✓					
	CS471		✓	✓	✓	✓													
	CS463											✓	✓	✓					
	CS453									✓	✓	✓	✓						
	IS417						✓	✓	✓	✓									
	IT371	✓				✓	✓	✓					✓						
			b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17

	Course	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12	c13	c14	c15	c16	
1st Level	CS141	✓	✓	✓	✓	✓												
	IT101	✓	✓	✓	✓													
	MATH101	✓	✓	✓														
	MATH102	✓	✓	✓	✓													
	PHYS101	✓	✓	✓	✓	✓	✓											
	PHYS102	✓	✓	✓	✓	✓												
	EE101	✓	✓	✓	✓	✓												
	EE102	✓	✓	✓	✓	✓												
	HUM111	✓	✓	✓								✓						
	HUM112	✓	✓	✓														
	HUM121	✓	✓	✓														
	HUM122	✓	✓	✓														
	HUM131	✓	✓	✓	✓													
	HUM132	✓	✓	✓														
	HUM133	✓	✓	✓	✓													
	HUM141	✓	✓	✓														
	HUM142	✓	✓	✓														
	HUM151	✓	✓	✓														
	HUM152	✓	✓	✓	✓													
	HUM153	✓	✓	✓														
HUM154	✓																	
2nd Level	CS201	✓	✓	✓	✓													
	CS211	✓	✓	✓	✓	✓	✓	✓										
	CS241	✓	✓	✓	✓													
	IS201		✓		✓	✓		✓			✓							
	IS211	✓	✓		✓		✓											
	IS212		✓	✓		✓	✓	✓										
	IS221	✓		✓	✓		✓	✓										
	IS231			✓		✓	✓	✓	✓	✓								
	IT251	✓	✓	✓	✓	✓												
	CE221	✓	✓	✓														
	MATH201	✓			✓													
	MATH202	✓	✓	✓	✓													
	EE201	✓			✓													
	HUM231	✓	✓	✓														
	HUM232	✓	✓	✓														

	HUM241	✓	✓														
3rd Level	CS301	✓	✓	✓	✓	✓	✓	✓	✓								
	CS302	✓	✓	✓	✓	✓	✓										
	CS321	✓	✓	✓	✓	✓											
	CS341	✓	✓	✓	✓	✓	✓	✓									
	CS351	✓	✓														
	CS352	✓	✓	✓	✓	✓											
	CS353	✓	✓	✓	✓												
	CS381	✓															
	CS391	✓	✓	✓	✓	✓	✓	✓									
	IT351	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	MM301	✓				✓	✓		✓			✓		✓		✓	
	MM302							✓	✓	✓	✓	✓	✓				
	MM321	✓			✓											✓	✓
	MM331		✓	✓	✓	✓	✓	✓									
	MATH301	✓	✓	✓	✓	✓	✓	✓	✓								
4th Level	MM401									✓	✓	✓		✓			
	MM402							✓	✓	✓	✓						
	MM403				✓	✓	✓	✓	✓	✓	✓						
	MM411	✓	✓	✓	✓	✓									✓	✓	
	MM412	✓		✓	✓	✓	✓	✓	✓	✓							
	MM421						✓	✓	✓	✓	✓	✓	✓				
	MM431			✓	✓	✓	✓										
	MM432		✓	✓	✓	✓	✓										
	MM422	✓	✓	✓	✓	✓	✓	✓									
	CS451		✓	✓	✓	✓	✓	✓									
	CS452								✓	✓	✓						
	CS471							✓	✓	✓	✓						
	CS463			✓	✓	✓	✓	✓	✓	✓							
	CS453		✓	✓	✓												
	IS417		✓	✓	✓	✓	✓	✓	✓								
IT371	✓	✓	✓	✓	✓												
		c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12	c13	c14	c15	c16

	Course	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11	d12	d13	d14	d15	d16
1st Level	CS141	✓	✓	✓	✓	✓	✓										
	IT101	✓	✓	✓	✓												
	MATH101	✓		✓													
	MATH102	✓		✓													
	PHYS101	✓	✓	✓	✓	✓	✓										
	PHYS102	✓	✓	✓	✓	✓	✓										
	EE101	✓	✓	✓	✓	✓	✓										
	EE102	✓	✓	✓	✓	✓											
	HUM111	✓	✓	✓	✓	✓	✓	✓									
	HUM112	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	HUM121	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	HUM122	✓	✓	✓	✓	✓	✓	✓									
	HUM131	✓	✓	✓	✓	✓	✓	✓									
	HUM132	✓	✓	✓	✓	✓	✓	✓									
	HUM133	✓	✓	✓	✓	✓	✓	✓									
	HUM141	✓	✓	✓	✓	✓	✓	✓									
	HUM142	✓	✓	✓													
	HUM151	✓	✓	✓													
	HUM152	✓	✓	✓													
	HUM153	✓	✓	✓													
HUM154	✓	✓	✓														
2nd Level	CS201	✓	✓	✓	✓												
	CS211	✓	✓	✓	✓	✓	✓										
	CS241	✓	✓	✓	✓	✓	✓										
	IS201	✓	✓	✓	✓		✓	✓		✓	✓						
	IS211	✓	✓	✓	✓		✓	✓		✓	✓						
	IS212	✓	✓	✓	✓		✓	✓		✓	✓						
	IS221	✓	✓	✓	✓				✓		✓				✓		
	IS231		✓	✓	✓	✓	✓	✓	✓								
	IT251	✓	✓	✓	✓	✓	✓										
	CE221	✓	✓	✓	✓												
	MATH201	✓	✓	✓	✓	✓											
	MATH202	✓	✓	✓	✓	✓	✓										
	EE201	✓	✓	✓	✓	✓											
	HUM231	✓	✓	✓	✓	✓	✓	✓									
	HUM232	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	HUM241	✓	✓	✓	✓	✓	✓	✓									

3 rd Level	CS301						✓	✓	✓	✓							
	CS302		✓	✓	✓	✓	✓	✓	✓	✓							
	CS321								✓	✓	✓	✓					
	CS341			✓	✓	✓	✓	✓	✓	✓	✓	✓					
	CS351								✓	✓	✓	✓					
	CS352											✓	✓	✓	✓		
	CS353						✓	✓	✓	✓	✓	✓	✓	✓	✓		
	CS381												✓	✓	✓	✓	
	CS391							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	IT351												✓	✓	✓	✓	
	MM301	✓	✓	✓	✓	✓	✓								✓	✓	✓
	MM302							✓			✓	✓	✓	✓	✓	✓	
	MM321								✓	✓	✓	✓	✓	✓	✓	✓	
	MM331		✓	✓	✓	✓	✓										
	MATH301				✓	✓	✓	✓	✓	✓	✓						
4 th Level	MM401	✓												✓	✓	✓	✓
	MM402									✓	✓	✓	✓				
	MM403				✓	✓	✓	✓	✓	✓	✓	✓	✓				
	MM411										✓	✓	✓	✓	✓	✓	✓
	MM412					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MM421										✓	✓	✓	✓	✓	✓	✓
	MM431		✓	✓	✓	✓											
	MM432	✓	✓	✓	✓	✓											
	MM422					✓	✓	✓	✓	✓	✓	✓	✓				
	CS451						✓	✓	✓	✓							
	CS452	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	CS471							✓	✓	✓	✓						
	CS463		✓	✓	✓	✓	✓	✓	✓	✓	✓						
	CS453							✓	✓	✓	✓						
	IS417								✓	✓	✓	✓					
IT371						✓	✓	✓	✓	✓	✓						
	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11	d12	d13	d14	d15	d16	

Program Matrix VII (Aims - ILOs)

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	a1. Understand the essential mathematics relevant to computer science and multimedia.	✓	✓					
	a2. Understand high-level programming languages.	✓	✓	✓				
	a3. Demonstrate basic knowledge and understanding of a core of mathematical analysis, algebra, applied mathematics and statistics.	✓			✓			
	a4. Interpret data qualitatively and/or quantitatively.	✓	✓					
	a5. Know and understand the principles and techniques of a number of application areas informed by the research directions of multimedia.		✓				✓	
	a6. Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition, computer vision and Human computer Interaction.	✓					✓	✓
	a7. Understand the fundamental topics in computer systems, including hardware architectures and operating systems.	✓	✓	✓		✓		✓
	a8. Select advanced topics to provide a deeper understanding of some aspects of object-oriented analysis and design, and software engineering.	✓	✓	✓	✓		✓	

Intended Learning Outcomes (ILO's) of the program		Teaching and Learning Methods						
		Lecture	Tutorials exercises	Practical exercises	Workshops	Projects	Case study	Data collection
	a9. Select advanced topics to provide a deeper understanding of some aspects of the artificial intelligence, image processing, and computer graphics and animation.	✓	✓	✓	✓			✓
	a10. Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems.	✓	✓	✓	✓	✓	✓	✓
	a11. Provide a deeper understanding of legal, professional and moral aspects of the exploitation of computing.	✓	✓			✓		✓
	a12. Know the tools, practices and methodologies used in the specification, design, implementation and critical evaluation of multimedia systems.	✓	✓	✓		✓		✓
	a13. Know the methods used in defining and assessing criteria for measuring the extent to which a computer system is appropriate for its current deployment and future evolution.	✓	✓	✓		✓		
	a14. Know the current and underlying technologies that support computer processing and inter-computer communication.	✓	✓	✓	✓		✓	
	a15. Understand of the principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results.	✓			✓		✓	
Intellectual	b1. Discuss traditional and nontraditional problems, set goals towards solving them, and observe results.		✓	✓			✓	

Intended Learning Outcomes (ILO's) of the program	Teaching and Learning Methods						
	Lecture	Tutorials exercises	Practical exercises	Workshops	Projects	Case study	Data collection
b2. Compare between (methods, techniques...etc).		✓			✓	✓	
b3. Apply classifications of (data, results, methods, techniques.. etc.).		✓			✓	✓	
b4. Analyze attributes, components, relationships, patterns, main ideas, and errors.		✓				✓	
b5. Summarize the proposed solutions and their results.			✓		✓		
b6. Restrict solution methodologies upon their results.			✓		✓		
b7. Establish criteria, and verify solutions.			✓		✓	✓	
b8. Show a range of solutions and critically evaluate and justify proposed design solutions.		✓	✓				
b9. Analyze computer science problems with pressing commercial or industrial constraints.			✓		✓	✓	
b10. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.			✓		✓		
b11. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application).		✓	✓				
b12. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline.			✓			✓	✓
b13. Apply knowledge and methods from a variety of sources		✓	✓		✓		

Intended Learning Outcomes (ILO's) of the program		Teaching and Learning Methods						
		Lecture	Tutorials exercises	Practical exercises	Workshops	Projects	Case study	Data collection
	b14. Analyze requirements of information manipulation and communication problems and design solutions based around appropriate integration of multimedia, Internet and computer software technologies		✓	✓		✓	✓	
	b15. Plan, conduct and report on a program of work covering multiple system lifecycle stages and leading to an end-product, with evaluation of the end-product, and the process and technologies employed.		✓	✓	✓		✓	
	b16. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences.		✓	✓		✓		
	b17. Correlate the results of tests to investigate the functionality of computer systems.		✓	✓		✓		
Professional Skills	c1. Use appropriate programming languages and design methodologies.		✓	✓		✓		
	c2. Use appropriate web-based systems, tools and design methodologies.		✓	✓		✓		
	c3. Specify, design, and implement computer-based 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	Teaching and Learning Methods						
	Lecture	Tutorials exercises	Practical exercises	Workshops	Projects	Case study	Data collection
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. 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.	✓	✓		✓			✓
c7. Make effective use of general computing facilities, plan and manage a project to complete within budget and schedule.		✓	✓	✓			✓
c8. Manage the need for continuing professional development in recognition of the need for lifelong learning.		✓	✓	✓			✓
c9. Operate computing equipment efficiently, taking into account its logical and physical properties.	✓			✓			✓
c10. Apply tools and techniques for the design and development of applications.		✓	✓		✓	✓	
c11. Apply Internet technology		✓		✓			✓
c12. Prepare technical reports and presentations	✓			✓			✓
c13. Use appropriate diagrammatic and formal written notations in design work and in reports	✓			✓			
c14. Use a programming language and a variety of software tools and environments to construct, test and document software applications, which may include multimedia components.		✓	✓		✓		

Intended Learning Outcomes (ILO's) of the program		Teaching and Learning Methods						
		Lecture	Tutorials exercises	Practical exercises	Workshops	Projects	Case study	Data collection
	c15. Use multimedia production systems	✓			✓			✓
	c16. Apply software engineering and application technologies to achieve effective communication and interaction with end users		✓	✓		✓		✓
General Skills	d1. Communicate effectively by oral, written and visual means.		✓	✓		✓		
	d2. Work effectively as an individual and as a member of a team.		✓			✓		
	d3. Collaborate effectively within multidisciplinary team.		✓			✓		
	d4. Work in stressful environment and within constraints.			✓		✓		
	d5. Prepare and present seminars to a professional standard.		✓	✓		✓		
	d6. Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy.		✓	✓		✓		
	d7. Demonstrate efficient IT capabilities.		✓	✓	✓	✓		
	d8. Lead and motivate individuals.		✓			✓		
	d9. Manage tasks and resources.		✓	✓		✓		
	d10. Search for information and adopt life-long self-learning.		✓	✓		✓		✓
	d11. Acquire entrepreneurial skills.			✓		✓		
	d12. Manage one's own learning and development.		✓	✓		✓		

Intended Learning Outcomes (ILO's) of the program	Teaching and Learning Methods						
	Lecture	Tutorials exercises	Practical exercises	Workshops	Projects	Case study	Data collection
d13. Prepare their work in the form of reports.		✓	✓		✓		
d14. Communicate effectively with team members, managers and costumers.		✓	✓		✓		
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.		✓	✓		✓		✓

Intended Learning Outcomes (ILO's) of the program		Assessment methods				
		Final Exam	Mid-Term Exam	Practical Exam	Class Work	Oral Exam
Knowledge and Understanding	a1. Understand the essential mathematics relevant to computer science and multimedia.	✓	✓			
	a2. Use high-level programming languages.	✓	✓	✓	✓	
	a3. Demonstrate basic knowledge and understanding of a core of mathematical analysis, algebra, applied mathematics and statistics.	✓	✓		✓	
	a4. Interpreting and analyzing data qualitatively and/or quantitatively.	✓	✓		✓	
	a5. Know and understand the principles and techniques of a number of application areas informed by the research directions of multimedia.	✓	✓		✓	
	a6. Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition, computer vision and Human computer Interaction.	✓	✓			
	a7. Understanding of fundamental topics in computer systems, including hardware architectures and operating systems.	✓	✓	✓	✓	
	a8. Select advanced topics to provide a deeper understanding of some aspects of object-oriented analysis and design, and software engineering.	✓	✓		✓	
	a9. Select advanced topics to provide a deeper understanding of some aspects of the artificial intelligence, image processing, and computer graphics and animation.	✓	✓	✓	✓	
	a10. Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems.	✓	✓	✓	✓	

Intended Learning Outcomes (ILO's) of the program		Assessment methods				
		Final Exam	Mid-Term Exam	Practical Exam	Class Work	Oral Exam
	a11. Provide a deeper understanding of legal, professional and moral aspects of the exploitation of computing.	✓	✓		✓	
	a12. Knowledge of the tools, practices and methodologies used in the specification, design, implementation and critical evaluation of multimedia systems.	✓	✓	✓	✓	
	a13. Knowledge of the methods used in defining and assessing criteria for measuring the extent to which a computer system is appropriate for its current deployment and future evolution.	✓	✓	✓	✓	
	a14. Knowledge and understanding of the current and underlying technologies that support computer processing and inter-computer communication.	✓	✓	✓	✓	
	a15. Knowledge and understanding of the principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results.	✓	✓		✓	
Intellectual Skills	b1. Define traditional and nontraditional problems, set goals towards solving them, and observe results.	✓	✓		✓	
	b2. Perform comparisons between (methods, techniques...etc).	✓	✓		✓	
	b3. Perform classifications of (data, results, methods, techniques.. etc.).	✓	✓		✓	
	b4. Identify attributes, components, relationships, patterns, main ideas, and errors.	✓	✓		✓	
	b5. Summarize the proposed solutions and their results.	✓	✓		✓	
	b6. Restrict solution methodologies upon their results.	✓	✓		✓	
	b7. Establish criteria, and verify solutions.	✓	✓		✓	

Intended Learning Outcomes (ILO's) of the program		Assessment methods				
		Final Exam	Mid-Term Exam	Practical Exam	Class Work	Oral Exam
	b8. Identify a range of solutions and critically evaluate and justify proposed design solutions.	✓	✓		✓	
	b9. Solve computer science problems with pressing commercial or industrial constraints.	✓	✓		✓	
	b10. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.	✓	✓		✓	
	b11. Create and/or justify designs to satisfy given requirements (synthesis, evaluation, application).	✓	✓	✓	✓	
	b12. Apply the concepts, principles, theories and practices underpinning computing as an academic discipline.	✓	✓	✓	✓	
	b13. Integrate and apply knowledge and methods from a variety of sources	✓	✓		✓	
	b14. Analyse requirements of information manipulation and communication problems and design solutions based around appropriate integration of multimedia, Internet and computer software technologies	✓	✓		✓	
	b15. Plan, conduct and report on a program of work covering multiple system lifecycle stages and leading to an end-product, with evaluation of the end-product, and the process and technologies employed.	✓	✓	✓	✓	
	b16. Synthesize ideas, proposals and designs effectively using rational and reasoned arguments for presentation to a range of audiences.	✓	✓		✓	
	b17. Generate and evaluate the results of tests to investigate the functionality of computer systems.				✓	
Professional	c1. Use appropriate programming languages and design methodologies.	✓	✓	✓	✓	
	c2. Use appropriate web-based systems, tools and design methodologies.	✓	✓	✓	✓	

Intended Learning Outcomes (ILO's) of the program	Assessment methods				
	Final Exam	Mid-Term Exam	Practical Exam	Class Work	Oral Exam
c3. Specify, design, and implement computer-based 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. 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.	✓	✓		✓	
c7. Make effective use of general computing facilities, plan and manage a project to complete within budget and schedule.	✓	✓	✓	✓	
c8. Appreciate and manage the need for continuing professional development in recognition of the need for lifelong learning.	✓	✓	✓	✓	
c9. Operate computing equipment efficiently, taking into account its logical and physical properties.	✓	✓		✓	
c10. Apply tools and techniques for the design and development of applications.	✓	✓	✓	✓	
c11. Apply Internet technology	✓	✓		✓	
c12. Prepare technical reports and presentations	✓	✓			
c13. Use appropriate diagrammatic and formal written notations in design work and in reports	✓	✓			

Intended Learning Outcomes (ILO's) of the program		Assessment methods				
		Final Exam	Mid-Term Exam	Practical Exam	Class Work	Oral Exam
	c14. Use a programming language and a variety of software tools and environments to construct, test and document software applications, which may include multimedia components.	✓	✓	✓	✓	
	c15. Use multimedia production systems	✓	✓		✓	
	c16. Apply ISE techniques to achieve effective communication and interaction with end users	✓	✓	✓	✓	
General Skills	d1. Communicate effectively by oral, written and visual means.	✓	✓	✓	✓	✓
	d2. Work effectively as an individual and as a member of a team.			✓	✓	
	d3. Collaborate effectively within multidisciplinary team.			✓	✓	
	d4. Work in stressful environment and within constraints.			✓	✓	
	d5. Prepare and present seminars to a professional standard.			✓	✓	
	d6. Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy.		✓		✓	
	d7. Demonstrate efficient IT capabilities.		✓	✓	✓	
	d8. Lead and motivate individuals.			✓	✓	
	d9. Manage tasks and resources.	✓	✓	✓	✓	
	d10. Search for information and adopt life-long self-learning.	✓	✓	✓	✓	✓
	d11. Acquire entrepreneurial skills.			✓	✓	
	d12. Manage one's own learning and development.			✓	✓	
	d13. Prepare their work in the form of reports.			✓	✓	

Intended Learning Outcomes (ILO's) of the program		Assessment methods				
		Final Exam	Mid-Term Exam	Practical Exam	Class Work	Oral Exam
	d14. Communicate effectively with team members, managers and costumers.			✓	✓	
	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.			✓	✓	

Approved by Dean: Prof. Adel A. Swiesy

Signature:

Date: