Ministry of Education
King Saud University (KSU)
Deanship of Graduate Studies

College of Computer and
Information Sciences
Department of Information Systems

MSc in Information Systems

(Thesis Option / Non–thesis Option)

Academic Year

1442 AH / 2020 G

• Introduction

The college of Computer and Information Sciences (CCIS) was created under the issued Royal Order No. 7/1558/m in the year 1404 H. The Department of Information Systems was one of main departments of the CCIS. It has been serving students for more than thirty-six years, graduating a large proportion of Saudis cadres and leaders of information technology in the Kingdom of Saudi Arabia to meet the growing needs in the information technology sector. Fast and continuous developments and changes in information technology disciplines require a review of this program every few years to cope with rapid changes. The department has been offering the Master's program since the late 1990's, and a PhD program in conjunction with other departments of the college since the mid 2000's and independently from other departments recently in the Fall Semester of 2017.

The department of Information Systems contributes strongly in many research activities of the CCIS. Its members participate on a regular basis in scientific seminars and conferences held within and outside of the Kingdom in addition to publishing in many journals and edited books. The research areas of the department include: database systems, data mining, decision support systems (DSS), intelligent information systems, information security, data science, knowledge-based systems, data warehouses, enterprise resource planning (ERP) systems, geographic information systems (GIS), and e-business. Faculty members of the department combined have published hundreds of scientific refereed papers, a good number of them are ISI indexed.

The modified Master of Science in Information Systems Program is designed to cope with new advancements in the field of information systems. It offers three tracks in hot and advanced topics that have big global and local demand. These tracks include: Data Science, Digital Transformation, and Information and Enterprise Systems Engineering. Moreover, it has thesis and non-thesis options to serve various educational needs and future career endeavors for students.

• Degree's Name

- ❖ MSc in Information Systems / Data Science.
- ❖ MSc in Information Systems / Information and Enterprise Systems Engineering.
- ❖ MSc in Information Systems / Digital Transformation.

• Program's Language

- ❖ English

- ## Significance and Justifications of Program Amendment

  1. Update and create new tracks and courses to cope with recent developments in the field.
  2. Offer several newly created tracks to serve various educational and career needs for students. These tracks are related to advanced and hot topics in information systems, including Data Science, Digital Transformation, and Information and Enterprise Systems Engineering. These fields have big demands both locally and globally. For example, the Business-Higher Education Forum (BHEF), reports that nearly 70% of business leaders in the United States will prefer job applicants with data skills by 2021. Locally, the digital transformation that Saudi Arabia is witnessing to achieve its 2030 vision, in addition to the recent creation of the Saudi Authority for Data and Artificial Intelligence, are all expected to create big demands for IS related fields.
  3. Based on a conducted labor market survey, 84% of IS graduates agree on introducing in-depth subjects in the IS field; and 89% saw an urgent demand for the proposed program amendment.

- ## Program's Vision

  To be a leading information systems program that prepares graduates for quality research and outstanding professional careers in information systems.

- ## Program's Mission

  Equip students with knowledge and skills that allow them to reach exceptional career expectations in the various fields of information systems.

- ## Program's Objectives

  1. Deliver a solid curriculum in information Systems, which conforms to guidelines laid down by the Deanship of Graduate Studies at King Saud University.
  2. Prepare qualified students for further higher education opportunities.
  3. Prepare students to conduct applied research that has direct impact on the concerns of the local community.
  4. Supply local industries and educational systems with a qualified IT workforce.
  5. Allow students to select from various tracks to serve their educational needs and future career endeavors.
  6. Allow several studying tracks that gives the priority to the student

- ## Program's Outcomes

A- Knowledge and Comprehension:

- Obtain advanced knowledge of the areas of information Systems and incorporating awareness of current issues and research.
- Obtain advanced application-based knowledge related to the broad range of activities within the Domains of information systems, and specialist knowledge in applications relating to a number of specialist areas.
- Obtain advanced knowledge in Data analysis, incorporating specification, design, development and deployment of information systems to meet domain needs, and critical understanding of the range of tools and techniques available to support this process.
- Demonstrate advanced technical knowledge associated with the development of information systems within an organization.

B- Mental Skills:

- Obtain advanced skills related to the broad range of activities within the information systems domains.
- Develop and apply advanced skills in critical analysis, evaluation and synthesis in consideration of the range of theories, concepts and techniques in use within the domain of information systems, and in the design of projects and experimental models.
- Make judgments with incomplete or inconsistent data, or where there are no professional or ethical codes or practices for guidance.
- Identify risks associated with the security of organizational data and recommend tools/techniques for mitigation of such risks.
- Integrate knowledge of analyzing, evaluating, and dealing with complex Information Systems-related phenomena, issues, and situations, even with limited information,
- Identify and formulate questions, to plan and execute advanced tasks within given time frames, as well as to evaluate this work.

C- Professional and Practical Skills:

- Demonstrate critical awareness of current legal, social, ethical and professional issues within the discipline
- Develop and utilize advanced problem-solving skills and techniques in the development of original and creative solutions to general and specialist issues relating to the use of information systems to support various domain practices.

- Develop and demonstrate advanced skills and techniques in communication with peers and academic/industrial staff, using a range of appropriate methods to suit different levels of knowledge and expertise within the audience
- Understand research ethics and how to appropriately build on the work of others.

D– General Skills:

- Obtain advanced skills in a number of mainstream and specialist areas within the domain of information systems, including Data Science, Digital Transformation, and Information and Enterprise Systems Engineering.
- Obtain research skills, and the capability of critical analysis, through review and analysis of current research literature
- Obtain advanced skills in information analysis, incorporating specification, design, development and deployment of information systems to meet application needs, and critical understanding of the range of tools and techniques available to support this process
- Work autonomously and within teams, as appropriate, demonstrating a capability for both taking and critically reflecting on roles and responsibilities.

- **Program Beneficiaries**:
  - Students who want to learn about the topics taught in the program, such as data science and digital transformation.
  - Employees who are interested in gaining new skills to serve their future career endeavors.
  - Employers who are looking for skilled workers in the information system field.
  - Faculty members with research interest related to topics taught in the program.
- **Employment Opportunities Available**:
  - Data Analyst/Scientist
  - Research Scientist
  - Teaching Assistant/Lecturer
  - Big Data Engineer
  - Business Process Analyst
  - Informational Computing Engineer
  - Enterprise Resource Planning Specialist

- **Admission Requirements**

In addition to the admission requirements mentioned in the unified regulations for graduate studies in Saudi universities and the organizational and executive rules and procedures for postgraduate studies at King Saud University, the department requires the following to enroll in the program:

1. Applicants must hold a BSc. Degree in Information Systems, Computer Science, Information technology, Software Engineering, or Computer Engineering from King Saud University or a University recognized by the Ministry of Education, with a minimum GPA of 3.25 out of 5.00 or equivalent;

2. Applicants shall possess a score of no less than (45) in the TOEFL – IBT exam or equivalent;

3. Applicants should have a score of no less than (144) in the GRE (quantitative reasoning part) or a score of no less than (73) in the Post-graduate Qudurat exam (quantitative part).

- **Requirements for obtaining the Degree**
  - **Thesis Option**
    - Passing (25) study units of master's courses
    - Successful completion of master's dissertation
  - **Non-thesis option**
    - Passing (33) study units of Master's courses including the research project
- **Program's Tracks**:
  1. Data Science
  2. Digital Transformation
  3. Information and Enterprise Systems Engineering

- **Program General Structure**:
  - **Thesis Option**
    - Number of required units is (25) study units in addition to (6) thesis study units as follows:

Type of Courses		No. of Courses		No. of Units Required
Core courses	**General**	(5)	(7)	(19) Study units
	Track	(2)		
Elective courses		(2)		(6) Study units
Thesis		(1)		(6) Study units
Total		(**10**)		(**25**) **Study units Study unit +** (**6**) **study units for thesis**

  - **Non-thesis Option**
    - Number of units required is (33) including the Research project as follows:

Type of Courses		No. of Courses		No. of Units Required
Core courses	**General**	(4)	(6)	(18) Study units
	Track	(2)		
Elective courses	**General**	(1)	(3)	(9) Study units
	Track	(2)		
Research Project		(2)		(6) Study units
Total		(**11**)		(**33**) **Study units**

1. MSc in Information Systems / Data Science Study Plan

Thesis Option

- **First Level**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS 524	Advanced Information Systems Analysis & Design	3(3+0)	Lecture	Included	
2	IS 533	Advanced Topics in Databases	3 (3+0)	Lecture	Included	
3	IS 536	Information Security Governance	3 (3+0)	Lecture	Included	
Total			(**9**) **Study Units**			

- **Second Level**

#	Course Code	Name	**No. of Study Units**	**Activity**	**Assessment GPA: (incl./excl.)**	**Pre-requisite**
1	IS 537	Artificial Intelligence & Knowledge-based Systems	3 (3+0)	Lecture	Included	
2	IS 541	Data Mining & Knowledge Discovery	3 (3+0)	Lecture	Included	
3	IS 564	Advanced Topics in Data Science	3 (3+0)	Lecture	Included	
Total			**(9) Study Units**			

- **Third Level**

#	**Course Code**	**Name**	**No. of Study Units**	**Activity**	**Assessment GPA: (incl./excl.)**	**Pre-requisite**
1	IS …	Elective course (1) from list A	3 (3+0)	Lecture	Included	
2	IS …	Elective course (2) from list A	3 (3+0)	Lecture	Included	
3	IS 596	Thesis Proposal Preparation	1(1+0)	Supervision	Pass/Fail	(15) study units
Total			**(7) Study Units**			

- **Fourth Level**

#	**Course Code**	**Name**	**No. of Study Units**	**Activity**	**Assessment GPA: (incl./excl.)**	**Pre-requisite**
1	IS 600	Thesis	6 (6+0)	Supervision	Pass/Fail	IS 596
Total			**(6) Study Units**			

- **List (A) of elective courses: student must select (2) courses from the following**

#	**Course Code**	**Name**	**No. of Study Units**	**Activity**	**Assessment GPA (incl./excl.)**	**Pre-requisite**
1	IS 526	Knowledge Management Systems	3 (3+0)	Lecture	Included	
2	IS 531	Document Storage & Retrieval Systems	3 (3+0)	Lecture	Included	
3	IS 546	Distributed Data Intensive Systems	3 (3+0)	Lecture	Included	
4	IS 552	Geographic and Spatial Data Management	3 (3+0)	Lecture	Included	
5	IS 560	Big Data Analytics	3 (3+0)	Lecture	Included	
6	IS 562	Modeling and Simulation in Decision Making	3 (3+0)	Lecture	Included	
7	IS 565	Advanced Quantitative Methods for Information Systems	3 (3+0)	Lecture	Included	
8	IS 571	Machine Learning Techniques	3 (3+0)	Lecture	Included	
9	IS 576	Language Processing for Social Networks	3 (3+0)	Lecture	Included	
10	IS 581	Selected Topics in Data Science	3 (3+0)	Lecture	Included	

❖ Non–thesis Option

○ First Level

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre–requisite
1	IS 524	Advanced Information Systems Analysis & Design	3(3+0)	Lecture	Included	
2	IS 533	Advanced Topics in Databases	3 (3+0)	Lecture	Included	
3	IS 536	Information Security Governance	3 (3+0)	Lecture	Included	
Total			**(9) Study Units**			

○ Second Level

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre–requisite
1	IS 537	Artificial Intelligence & Knowledge–based Systems	3 (3+0)	Lecture	Included	
2	IS 541	Data Mining & Knowledge Discovery	3 (3+0)	Lecture	Included	
3	IS 564	Advanced Topics in Data Science	3 (3+0)	Lecture	Included	
Total			**(9) Study Units**			

○ Third Level

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre–requisite
1	IS …	Elective course (1) from list A	3 (3+0)	Lecture	Included	
2	IS …	Elective course (2) from list A	3 (3+0)	Lecture	Included	
3	IS 595	Research Project (1)	3 (0+6)	Project	Included	
Total			**(7) Study Units**			

○ Fourth Level

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre–requisite
1	IS …	Elective course (3) from list B	3 (3+0)	Lecture	Included	
2	IS 597	Research Project (2)	3 (0+6)	Project	Included	IS 595
Total			**(6) Study Units**			

○ List (B) of elective courses: student must select (1) course from the following

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA (incl./excl.)	Pre–requisite
1	IS 522	Enterprise Application Development	3 (3+0)	Lecture	Included	
2	IS 532	Advanced Enterprise Resource Planning	3 (3+0)	Lecture	Included	
3	IS 534	Information Systems Quality Assurance	3 (3+0)	Lecture	Included	
4	IS 540	Software Project Management & Quality	3 (3+0)	Lecture	Included	
5	IS 542	Business Process Management Systems	3 (3+0)	Lecture	Included	
6	IS 548	Enterprise Cloud Computing	3 (3+0)	Lecture	Included	

7	IS 550	Information & Requirement Engineering	3 (3+0)	Lecture	Included	
8	IS 551	Health Information Management	3 (3+0)	Lecture	Included	
9	IS 554	Enterprise Content Management	3 (3+0)	Lecture	Included	
10	IS 563	Information Security Management & Audit	3 (3+0)	Lecture	Included	
11	IS 566	Advanced Topics in Cyberspace and Cybersecurity	3 (3+0)	Lecture	Included	
12	IS 567	Secure Software Development	3 (3+0)	Lecture	Included	
13	IS 572	Blockchain Technologies	3 (3+0)	Lecture	Included	
14	IS 575	Web Intelligence	3 (3+0)	Lecture	Included	
15	IS 577	Financial Technologies	3 (3+0)	Lecture	Included	
16	IS 578	Internet of Things	3 (3+0)	Lecture	Included	
17	IS 582	Selected Topics in Digital Transformation	3 (3+0)	Lecture	Included	
18	IS 592	Selected topics in Enterprise Information Systems	3 (3+0)	Lecture	Included	
19	IS 593	Selected Topics in E-Commerce	3 (3+0)	Lecture	Included	

2. MSc in Information Systems / Information and Enterprise Systems Engineering Study Plan

❖ Thesis Option

- **First Level**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS 524	Advanced Information Systems Analysis & Design	3(3+0)	Lecture	Included	
2	IS 533	Advanced Topics in Databases	3 (3+0)	Lecture	Included	
3	IS 536	Information Security Governance	3 (3+0)	Lecture	Included	
Total			**(9) Study Units**			

- **Second Level**:

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS 537	Artificial Intelligence & Knowledge-based Systems	3 (3+0)	Lecture	Included	
2	IS 532	Advanced Enterprise Resource Planning	3 (3+0)	Lecture	Included	
3	IS 550	Information & Requirement Engineering	3 (3+0)	Lecture	Included	
Total			**(9) Study Units**			

- **Third Level**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS …	Elective course (1) from list C	3 (3+0)	Lecture	Included	
2	IS …	Elective course (2) from list C	3 (3+0)	Lecture	Included	
3	IS 596	Thesis Proposal Preparation	1(1+0)	Supervision	Pass/Fail	(15) study units
Total			**(7) Study Units**			

- **Fourth Level**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS 600	Thesis	6 (6+0)	Supervision	Pass/Fail	IS 596
Total			**(6) Study Units**			

- **List (C) of elective courses: student must select (2) courses from the following**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA (incl./excl.)	Pre-requisite
1	IS 522	Enterprise Application Development	3 (3+0)	Lecture	Included	
2	IS 534	Information Systems Quality Assurance	3 (3+0)	Lecture	Included	
3	IS 540	Software Project Management & Quality	3 (3+0)	Lecture	Included	
4	IS 542	Business Process Management Systems	3 (3+0)	Lecture	Included	
5	IS 548	Enterprise Cloud Computing	3 (3+0)	Lecture	Included	
6	IS 554	Enterprise Content Management	3 (3+0)	Lecture	Included	
7	IS 563	Information Security Management & Audit	3 (3+0)	Lecture	Included	
8	IS 592	Selected topics in Enterprise Information Systems	3 (3+0)	Lecture	Included	

❖ Non-thesis Option

- **First Level**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS 524	Advanced Information Systems Analysis & Design	3(3+0)	Lecture	Included	
2	IS 533	Advanced Topics in Databases	3 (3+0)	Lecture	Included	
3	IS 536	Information Security Governance	3 (3+0)	Lecture	Included	
Total			**(9) Study Units**			

- **Second Level**

#	Course Code	Name	**No. of Study Units**	**Activity**	**Assessment GPA: (incl./excl.)**	**Pre-requisite**
1	IS 537	Artificial Intelligence & Knowledge-based Systems	3 (3+0)	Lecture	Included	
2	IS 532	Advanced Enterprise Resource Planning	3 (3+0)	Lecture	Included	
3	IS 550	Information & Requirement Engineering	3 (3+0)	Lecture	Included	
Total			**(9) Study Units**			

- **Third Level**

#	**Course Code**	**Name**	**No. of Study Units**	**Activity**	**Assessment GPA: (incl./excl.)**	**Pre-requisite**
1	IS …	Elective course (1) from list C	3 (3+0)	Lecture	Included	
2	IS …	Elective course (2) from list C	3 (3+0)	Lecture	Included	
3	IS 595	Research Project (1)	3 (0+6)	Project	Included	
Total			**(7) Study Units**			

- **Fourth Level**

#	**Course Code**	**Name**	**No. of Study Units**	**Activity**	**Assessment GPA: (incl./excl.)**	**Pre-requisite**
1	IS …	Elective course (3) from list D	3 (3+0)	Lecture	Included	
2	IS 597	Research Project (2)	3 (0+6)	Project	Included	IS 595
Total			**(6) Study Units**			

- **List (D) of elective courses: student must select (1) course from the following**

#	**Course Code**	**Name**	**No. of Study Units**	**Activity**	**Assessment GPA (incl./excl.)**	**Pre-requisite**
1	IS 526	Knowledge Management Systems	3 (3+0)	Lecture	Included	
2	IS 531	Document Storage and Retrieval Systems	3 (3+0)	Lecture	Included	
3	IS 541	Data Mining & Knowledge Discovery	3 (3+0)	Lecture	Included	
4	IS 546	Distributed Data Intensive Systems	3 (3+0)	Lecture	Included	
5	IS 548	Enterprise Cloud Computing	3 (3+0)	Lecture	Included	
6	IS 551	Health Information Management	3 (3+0)	Lecture	Included	
7	IS 552	Geographic and Spatial Data Management	3 (3+0)	Lecture	Included	
8	IS 560	Big Data Analytics	3 (3+0)	Lecture	Included	
9	IS 562	Modeling and Simulation in Decision Making	3 (3+0)	Lecture	Included	
10	IS 564	Advanced Topics in Data Science	3 (3+0)	Lecture	Included	
11	IS 565	Advanced Quantitative Methods for Information Systems	3 (3+0)	Lecture	Included	
12	IS 566	Advanced Topics in Cyberspace and Cybersecurity	3 (3+0)	Lecture	Included	

13	IS 567	Secure Software Development	3 (3+0)	Lecture	Included	
14	IS 571	Machine Learning Techniques	3 (3+0)	Lecture	Included	
15	IS 572	Blockchain Technologies	3 (3+0)	Lecture	Included	
16	IS 575	Web Intelligence	3 (3+0)	Lecture	Included	
17	IS 576	Language Processing for Social Networks	3 (3+0)	Lecture	Included	
18	IS 577	Financial Technologies	3 (3+0)	Lecture	Included	
19	IS 578	Internet of Things	3 (3+0)	Lecture	Included	
20	IS 581	Selected Topics in Data Science	3 (3+0)	Lecture	Included	
21	IS 582	Selected Topics in Digital Transformation	3 (3+0)	Lecture	Included	
22	IS 593	Selected Topics in E-Commerce	3 (3+0)	Lecture	Included	

3. MSc in Information Systems / Digital Transformation Study Plan

❖ Thesis Option

○ First Level

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS 524	Advanced Information Systems Analysis & Design	3(3+0)	Lecture	Included	
2	IS 533	Advanced Topics in Databases	3 (3+0)	Lecture	Included	
3	IS 536	Information Security Governance	3 (3+0)	Lecture	Included	
Total			**(9) Study Units**			

○ Second Level

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS 537	Artificial Intelligence & Knowledge-based Systems	3 (3+0)	Lecture	Included	
2	IS 548	Enterprise Cloud Computing	3 (3+0)	Lecture	Included	
3	IS 566	Advanced Topics in Cyberspace and Cybersecurity	3 (3+0)	Lecture	Included	
Total			**(9) Study Units**			

○ Third Level

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS …	Elective course (1) from list E	3 (3+0)	Lecture	Included	
2	IS …	Elective course (2) from list E	3 (3+0)	Lecture	Included	
3	IS 596	Thesis Proposal Preparation	1(1+0)	Supervision	Pass/Fail	(15) study units
Total			**(7) Study Units**			

- **Fourth Level**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS 600	Thesis	6 (6+0)	Supervision	Pass/Fail	IS 596
Total			**(6) Study Units**			

- **List (E) of elective courses: student must select (2) courses from the following**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA (incl./excl.)	Pre-requisite
1	IS 572	Blockchain Technologies	3 (3+0)	Lecture	Included	
2	IS 575	Web Intelligence	3 (3+0)	Lecture	Included	
3	IS 577	Financial Technologies	3 (3+0)	Lecture	Included	
4	IS 578	Internet of Things	3 (3+0)	Lecture	Included	
5	IS 582	Selected Topics in Digital Transformation	3 (3+0)	Lecture	Included	
6	IS 593	Selected Topics in E-Commerce	3 (3+0)	Lecture	Included	

❖ Non-thesis Option

- **First Level**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS 524	Advanced Information Systems Analysis & Design	3(3+0)	Lecture	Included	
2	IS 533	Advanced Topics in Databases	3 (3+0)	Lecture	Included	
3	IS 536	Information Security Governance	3 (3+0)	Lecture	Included	
Total			**(9) Study Units**			

- **Second Level**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS 537	Artificial Intelligence & Knowledge-based Systems	3 (3+0)	Lecture	Included	
2	IS 548	Enterprise Cloud Computing	3 (3+0)	Lecture	Included	
3	IS 566	Advanced Topics in Cyberspace and Cybersecurity	3 (3+0)	Lecture	Included	
Total			**(9) Study Units**			

- **Third Level**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS …	Elective course (1) from list E	3 (3+0)	Lecture	Included	
2	IS …	Elective course (2) from list E	3 (3+0)	Lecture	Included	
3	IS 595	Research Project (1)	3 (0+6)	Project	Included	
Total			**(7) Study Units**			

- **Fourth Level**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA: (incl./excl.)	Pre-requisite
1	IS …	Elective course (3) from list F	3 (3+0)	Lecture	Included	
2	IS 597	Research Project (2)	3 (0+6)	Project	Included	IS 595
Total			**(6) Study Units**			

- **List (F) of elective courses: student must select (1) course from the following**

#	Course Code	Name	No. of Study Units	Activity	Assessment GPA (incl./excl.)	Pre-requisite
1	IS 522	Enterprise Application Development	3 (3+0)	Lecture	Included	
2	IS 526	Knowledge Management Systems	3 (3+0)	Lecture	Included	
3	IS 531	Document Storage and Retrieval Systems	3 (3+0)	Lecture	Included	
4	IS 532	Advanced Enterprise Resource Planning	3 (3+0)	Lecture	Included	
5	IS 534	Information Systems Quality Assurance	3 (3+0)	Lecture	Included	
6	IS 540	Software Project Management & Quality	3 (3+0)	Lecture	Included	
7	IS 541	Data Mining & Knowledge Discovery	3 (3+0)	Lecture	Included	
8	IS 542	Business Process Management Systems	3 (3+0)	Lecture	Included	
9	IS 546	Distributed Data Intensive Systems	3 (3+0)	Lecture	Included	
10	IS 548	Enterprise Cloud Computing	3 (3+0)	Lecture	Included	
11	IS 550	Information & Requirement Engineering	3 (3+0)	Lecture	Included	
12	IS 551	Health Information Management	3 (3+0)	Lecture	Included	
13	IS 552	Geographic and Spatial Data Management	3 (3+0)	Lecture	Included	
14	IS 554	Enterprise Content Management	3 (3+0)	Lecture	Included	
15	IS 560	Big Data Analytics	3 (3+0)	Lecture	Included	
16	IS 562	Modeling and Simulation in Decision Making	3 (3+0)	Lecture	Included	
17	IS 563	Information Security Management & Audit	3 (3+0)	Lecture	Included	
18	IS 564	Advanced Topics in Data Science	3 (3+0)	Lecture	Included	
19	IS 565	Advanced Quantitative Methods for Information Systems	3 (3+0)	Lecture	Included	
20	IS 567	Secure Software Development	3 (3+0)	Lecture	Included	
21	IS 571	Machine Learning Techniques	3 (3+0)	Lecture	Included	
22	IS 576	Language Processing for Social Networks	3 (3+0)	Lecture	Included	
23	IS 581	Selected Topics in Data Science	3 (3+0)	Lecture	Included	
24	IS 592	Selected topics in Enterprise Information Systems	3 (3+0)	Lecture	Included	

- **Program Courses Description**

IS 522	Enterprise Applications Development	3 (3+0)
Key concepts and principals involved in the development of enterprise applications. Essential emerging topics such as the service-oriented architectures and enterprise applications integration. Web services technologies and the role they play today in the development and integration of enterprise application. Key technologies, standards, protocols, and platforms being used in the design and implementation of modern enterprise applications.		
IS 524	**Advanced Information Systems Analysis & Design**	**3 (3+0)**
This course provides advanced concepts and techniques of information systems analysis and design. It provides coverage of advanced Unified Modelling Language (UML) notations used for structural and behavioral modeling. Topics in this course include also: modern information systems methodologies, process of communication, advanced design patterns, trends in systems design and systems architecture including service-oriented architecture, design strategies for large systems and cross-platform design. Other advanced topics are: analysis and design of complex information systems, systems thinking and modeling and Soft Systems Methodology.		
IS 526	**Knowledge Management Systems**	**3 (3+0)**
Knowledge concepts, Types of knowledge, Knowledge life cycle and the ways to identify, create, represent and distribute knowledge in organizations, Ubiquitous Knowledge Management, Knowledge Management in the cloud, Social Network, Tools for KM, Case studies (real-life cases and experiences of implementing KM in organizations.)		
IS 531	**Document Storage and Retrieval Systems**	**3 (3+0)**
Information Systems types-An overview: Information Retrieval Systems, DBMS, MIS, Decision Support Systems, Dialog Systems. Fundamentals of Retrieval Systems: Adjacency and term frequency features, Text analysis and automatic indexing, Thesaurus rules and construction, Retrieval evaluation. Document storage technology and techniques. Emerging technology: Hypertext systems, Multimedia and hypermedia systems, Hardware requirements.		

IS 532	Advanced Enterprise Resource Planning	3 (3+0)
Enterprise Resource Planning (ERP), organization, business processes, and integration, ERP implementation, Change Management (CM), Customer Relationship management, Supply Chain Management.		
IS 533	**Advanced Topics in Databases**	**3 (3+0)**
Database Systems: Semantic data modeling, Object-oriented databases, Query optimization, Semantic Integrity. Distributed Databases (DDB), Data fragmentation and distributed transparency, Distributed query processing, Concurrence control methods: Serializability in a DDB and the two-phase locking method, Concurrence control based on timestamps, The two-phase COMMIT protocol. Recovery management.		
IS 534	**Information Systems Quality Assurance**	**3 (3+0)**
How quality can be maintained and assured throughout the entire information system's project phases from system's selection and implementation all the way to system's decommissioning. Students will be exposed to the modern methodologies and standards being adopted in the industry, including TQM, COBIT, ITIL, CMMI, etc. Modern project management methodologies and concepts such as project management office, project portfolio management, maturity models, and IT governance will also be covered in this course.		
IS 536	**Information Security Governance**	**3 (3+0)**
Overview of skills, knowledge, techniques, and tools required by information-technology security professionals. Topics include security and risk management, physical security, access control, cryptography, security architecture and design, security for networks and telecommunications, application security, and legal considerations.		
IS 537	**Artificial Intelligence and Knowledge Based Systems**	**3 (3+0)**
Artificial Intelligence (AI) problem-solving concepts, Knowledge-based systems (KBS) defined, KBS domain of applications. Problem formulation and state space search. Knowledge representation: Rules, semantic nets, and frames. Knowledge acquisition techniques. Deduction with formal logic. Rule-based systems. Inexact reasoning. Expert systems (ES) Development. Building a business ES: A case study.		

IS 540	Software Project Management and Quality	3 (3+0)
Preparing for project: Project financial analysis and risk evaluation, Procurement models, Proposal strategies, technical, management and cost proposal. Project planning. Managing the project design effort and team: Preparing the system design, functional, and program specification; Technical quality assurance, Managing the project's implementation and acceptance phases. Post-completion analysis. Advanced project management techniques. Software quality assurance and control, Software metrics.		
IS 541	**Data mining and Knowledge Discovery**	**3 (3+0)**
This course equips students with the knowledge and skills needed in designing and implementing data mining systems. It covers the broad topics of data mining and warehousing and illustrates the knowledge and value that can be gained out of these technologies. The course focuses on the advanced data mining techniques and algorithms applied in association, classification, clustering. It also discusses modern modeling techniques used in designing data warehousing and OLAP systems. Students will also be exposed to modern data mining software tools and products.		
IS 542	**Business Process Management Systems**	**3 (3+0)**
The main principles and technologies applied in the domain of business process and workflow management systems. It discusses the background, origins, and evolution of business process management systems. It also covers the full lifecycle of business process management systems including modeling and design, and highlights the key relevant technologies, standards, and frameworks. In particular, it explores the evolving role played today by web services technologies and service-oriented architectures, in the composition, choreography, execution, and management of business processes.		
IS 544	**Distributed and Mobile-Based Information Systems**	**3 (3+0)**
Architectural models for distributed systems, server techniques, remote procedure call and multicast communication, RFID technology, Distributed transactions, concurrency control, reliability and security issues. Mobile Computing Platform, Wireless Network Principles, Wireless LAN and PAN, Cellular and Satellite Networks, Wireless Architectures, Wireless Security, Mobile Computing Strategic Planning, Mobile		

Computing Management and Support. Mobile Applications (M-Business, M-Government, M-Life, Positional Apps).

IS 546	Distributed Data Intensive Systems	3 (3+0)

This course introduces the fundamental concepts and computational paradigms of large-scale distributed data management. This includes introducing non-relational data model such document model, graph-based data model, and key-value store for modern NOSQL databases. This course covers the essential properties for modern distributed database such as scalability, high availability, and consistency. It covers techniques and methods for scaling data (partitioning techniques Partitioning by key range, by hash of key, Re-balancing partitions) in data-intensive application; high availability concept using replication methods and algorithms (Paxos, primary-backup, chain replication); Data consistency models from strong consistency to weaker data consistency issues. This course introduces MapReduce programming model for processing Big data.

IS 548	Enterprise Cloud Computing	3 (3+0)

This course will present the state of the art in cloud computing models, techniques, and architectures. Cloud computing has evolved as a very important computing model, which enables information, software, and other shared resources to be provisioned over the network as services in an on-demand manner. Students will be exposed to the current practices in cloud computing. Topics may include evolution of the cloud, enterprise cloud drivers and adoption trends, typical cloud enterprise workloads, architectural models for cloud computing; cloud computing platforms and services including Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), virtualization, security, privacy, and trust management; resource allocation and quality of service; cloud economics and business models; pricing and risk management; interoperability and internetworking; legal issues; advanced cloud programming paradigms such as Hadoop's MapReduce, concept of modern Big Data analysis on cloud platforms, different cloud computing standards, best practices and other advanced and research topics in cloud computing.

IS 550	Information and Requirements Engineering	3 (3+0)
Foundations of Information Engineering; Information Planning Components; Requirements Engineering; Meta-modeling and Modeling; Method Engineering; Method Engineering Support.		
IS 551	**Health Information Management**	**3 (3+0)**
The management activities that health care professionals will perform on information such as the electronic health records and coding. The business and domain of health care that give the opportunity to analyze requirements and data structure before the start of developing the IT application. While Health Informatics mainly deals with the application of technology to health care business, health information management is rather concerned with the management of personal health information in health care organization to deliver a quality health care. Records management, terminology, coding, transaction and the business of health care related to medical records management. Types of health care information systems such as hospital management system, labs and imaging systems, treatment, billing and prescribing systems.		
IS 552	**Geographic and Spatial Data Management**	**3 (3+0)**
Geographic Data manipulation, Representation of spatial objects, Vector model, Network and topological models, raster model, Computational geometry of GIS, Spatial Access Methods, Terrain modeling, GPS systems, Commercial systems: ArcInfo, ArcView GIS.		
IS 554	**Enterprise Content Management**	**3 (3+0)**
An introduction to enterprise content management, ECM components, document imaging, electronic content capture, indexing and classification. Document management (DM), records management (RM), business process management (BPM) and collaboration, XML and meta-data, Web Content Management (WCM), Web services, Web content delivery and RSS, WCM trends.		
IS 560	**Big Data Analytics**	**3 (3+0)**
Through this course, students will gain advanced knowledge on analyzing Big Data. The course covers Big Data storage, processing, analysis, visualization, and Big Data Algorithms, Graph Big Data, Graphical models and Baysian Network, Cognitive Mobile Analytics.		

IS 562	Modeling and Simulation in Decision Making	3 (3+0)
Principles of simulation: Model building, handling time in models, model attributes and parameters. Simulation languages and systems. Business application: Finance, Production, Inventory. Simulation of human decision-making, AI and simulation. Corporate simulation models and case studies.		
IS 563	**Information Security Management and Audit**	**3 (3+0)**
Processes associated with governance, policy, monitoring, incident management and management of the information security function, processes associated with the implementation of security configurations, processes associated with the selection and maintenance of security technologies. In addition, the following audit/assurance reviews will be covered. They are: Identity management, security incident management, network perimeter security, systems development, project management, IT risk management, data management, and vulnerability management.		
IS 564	**Advanced Topics in Data Science**	**3 (3+0)**
The course will provide a deep overview of data science methodologies and technology, including data understanding, modeling and analysis in big scale. Basic algorithms and software tools dealing with data. The topics covered are: Data understanding, Data cleaning, Data modeling, Data access analysis and interaction, Exploratory Data Analysis, Data Dimension Reduction, Data diagnosis, Deep learning, KNN, Naive Bayes, Linear and logistic regression, Trees and forests, Scaling up analytics.		
IS 565	**Advanced Quantitative Methods for Information Systems**	**3 (3+0)**
Quantitative analysis and the decision-making process, Principles of modeling, Data gathering Model solution, Dynamic Programming, Multi-criteria Decision Making, Simulation, Game theory, Principal Component Analysis, Linear and Non-Linear Discrimination, Optimization Techniques.		
IS 566	**Advanced Topics in Cyberspace and Cybersecurity**	**3 (3+0)**
This course will cover state of the art advances in the cybersecurity field, with particular emphases on emerging trends, threats and cyber areas, such as cyber war, espionage, and		

crime, in the domain. Topics to be covered include current topics in information assurance, advanced digital forensics, new approaches to management of cybersecurity and new threats, advanced vulnerabilities analysis. Students will learn how information security control mechanisms are implemented in the cyber space, examining contemporary security guidelines, practices, and applications in the real-world computing environments.		
IS 567	**Secure Software Development**	**3 (3+0)**
Principles of developing secure applications. Common programming errors that lead to software vulnerabilities, how these errors can be exploited, and effective mitigation strategies for preventing the introduction of such errors. Common programming vulnerability causes such as buffer overflows, dynamic memory management, integer overflows, sign errors, truncation errors, I/O vulnerabilities, etc. A specific programming language will be used throughout the course to demonstrate discussed concepts.		
IS 571	**Machine Learning Techniques**	**3 (3+0)**
This course will provide students with a working understanding of machine-learning techniques and their application to solve real-world problems. Both supervised and unsupervised learning methods will be covered. Specific topics include linear models for regression and classification, decision trees, support vector machines, kernel methods, dimension reduction, density estimation, neural networks and deep learning algorithms. Students will implement machine learning models with open-source software. They explore data and learn from data, finding underlying patterns useful for data reduction, feature analysis, prediction, and classification.		
IS 572	**Blockchain Technologies**	**3 (3+0)**
The course provides an overview, future trends of blockchain technologies, and their challenges. Moreover, it covers the mechanics of blockchain, smart contracts, consensus mechanism, and its security aspects. The course provides understanding the technical applications, services, and products that leverage blockchain benefits. Additionally, it covers Cryptocurrencies and the Crypto Ecosystem including Bitcoin and Ethereum.		
IS 575	**Web Intelligence**	**3 (3+0)**
This course gives the students foundation of how to gather, process, search and mine data in the Web and its applications to search engines. It will help the students to understand		

the basic concepts behind information retrieval and data mining in Web. It covers basic concepts of information retrieval and data mining, main document relevance models: Boolean, vector, probabilistic, browsing models, precision vs. retrieval, quality evaluation, reference collections, inverted indexes, construction, query processing. use of compression, architecture of a Web search engine, the crawler, indexing systems, queries and ranking, multimedia search: images, audio and video, mining the content of the Web like opinion mining, structure mining, finding communities, usage mining.		
IS 576	**Language Processing for Social Networks**	**3 (3+0)**
This course provides advanced concepts and techniques of natural language processing for social networks. It provides coverage of regular expressions, language modelling with N-grams, Spelling correction, Sentiment classification, syntactic, semantic and dependency parsing, Vector semantics, WordNet, Sentiment lexicons, information extraction and reference resolution, Deep Learning for text understanding, Topic Models and Language in Social Networks, Summarization.		
IS 577	**Financial Technologies**	**3 (3+0)**
The course covers various financial technologies and emerging trends related to payments, cryptocurrencies, financing, and asset management. This includes robo-advising, machine learning for fintech and quantitative financial analysis for technology-driven investment decisions.		
IS 578	**Internet of Things**	**3 (3+0)**
The usage of Internet of Things (IoTs) is growing rapidly and changing the world. This course gives an overview of the components of typical IoT devices and their future development. It includes understanding their advantages, barriers and underlying technologies in the adoption of IoT. Additionally, the course covers IoT design considerations and constraints, including design trades-offs between hardware and software. The course also covers understanding how to develop and implement IoT solutions.		
IS 581	**Selected topics in Data Science**	**3 (3+0)**
Covering and discussing the recent trends, technologies, systems, and emerging topics, in all key matters concerning data science such as new trends for data pre-processing, pattern		

mining, data visualization. This course will also cover data science and its relationship with other Information Science fields. Recent Data Science Techniques and Algorithms could be studied.

IS 582	Selected topics in Digital Transformation	3 (3+0)

Special topics of current interest in digital transformation, students will develop, an in-depth understanding of the role of digital transformation in the enterprise, new trends in Digital Transformation will be covered.

IS 592	Selected topics in Enterprise Information Systems	3 (3+0)

Special topics of current interest in Enterprise Information Systems, students will develop, an in-depth understanding of the role of semantics and ontology in the enterprise, new patterns for enterprise architectures, Enterprise Application Integration. Enterprise Messaging, new Artificial Intelligence techniques and trends for Enterprise Information Systems.

IS 593	Selected topics in E-Commerce	3 (3+0)

Covering and discussing the recent trends, technologies, systems, and emerging topics, in all key matters concerning E-commerce such as new trends for Electronic Payment Systems, Internet Marketing, Customer Relationship Management, Web services. Recent Data Mining Techniques for E-Commerce could be studied.

IS 595	Research Project (1)	3 (0+6)

A survey of the theoretical and technical aspects of a research topic to be agreed upon with the student's advisor. An oral presentation and a written report are required.

IS 597	Research Project (2)	3 (0+6)

Prerequisite: IS 595

Bridging the gap between the academic study and training needed by industry and businesses. Students are initiated to work under close faculty supervision on real-world problems of sufficient magnitude. Project implementation and documentation are main concerns. The final report should be comprehensive, well written and organized to reflect an effective approach to carry out the work involved.

IS 596	Research Proposal Preparation	1 (1+0)
In this course the student will specify a research topic under the supervision of a faculty member and prepare a thesis proposal to be approved.		
IS 600	**Thesis**	**6 (6+0)**
Prerequisite: IS 596		