YEREVAN STATE UNIVERSITY

IT EDUCATIONAL AND RESEARCH CENTER

«INFORMATION SYSTEMS» SPECIALTY

INFORMATION SYSTEMS MANAGEMENT

GRADUATE PROGRAM

GUIDE

General and special courses

Code	Name of the course			Semester
2301/M02	Foundations of Programming Languages			1
Lecturer	Candidate of Physical and Mathematical Sciences, Associate Professor A.Kostanyan			
Number of credits	**Hours in auditorium**	**Total hours**	**Self-training hours**	**Weekly hours**
3	4/28	90	58	2

Grading Procedure	EVALUATION STRUCTURE	Course content
○ Homeworks	4 points (20%)	Course is a continuation of a corresponding undergraduate level course on imperative programming systems. The structure of logic programming Prolog [illegible] interpreter. Programming of types. Problem solving in Prolog system: processing of lists, polynomials and matrices, sorting and graph algorithms, scanning and parsing algorithms.
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100 %)	

Code	Name of the course			Semester
2301/M03	Foundations of Database Systems			1
Lecturer	Candidate of Physical and Mathematical Sciences, Associate Professor M.Manukyan			
Number of credits	**Hours in auditorium**	**Total hours**	**Self-training hours**	**Weekly hours**
3	**4/28**	**90**	**58**	**2**

Grading Procedure	EVALUATION STRUCTURE	Course content
○ **Homeworks**	**4 points (20%)**	Theory and application issues for relational, object, object-relational, deductive and semi-structured data models are considered. ODMG C++ interface, SQL99 and OQL
○ **Interrrogates**	**2 points (10%)**	
○ **Midterm examinations**	**6 points (30%)**	
○ **Final examination**	**8 points (40%)**	**6 points (30%)**
Total grade	**20 points (100 %)**	Formal basis of relational query languages, active, semi-structured and deductive databases is considered in detail. Theoretical considerations are accompanied by development of corresponding projects in well-known database systems which help to acquire the knowledge. A comparative analysis of different approaches in database systems is provided. Prerequisisties: Basics of Database Systems

Bridging Courses

Code	Name of the course			Semester
2301/M00	Extended Programming in C++			1
Lecturer	Candidate of Physical and Mathematical Sciences, Associate Professor A.Kostanyan			
Number of credits	**Hours in auditorium**	**Total hours**	**Self-training hours**	**Weekly hours**
3	4/28	90	58	2
Grading Procedure	**EVALUATION STRUCTURE**	**Course content**		
		General structure of STL. Sequential, adapted and associated containers. Functional objects and iterator adapters. Algorithms. The concept of extended programming. A concept, a model, development of a concept. Concept of iterators and containers. Models defined in STL. Building of other models.		

Code	Name of the course			Semester
2301/M00	Basics of Database Systems			1
Lecturer	Candidate of Physical and Mathematical Sciences, Associate Professor M.Manukyan Candidate of Physical and Mathematical Sciences, Associate Professor R.Topchyan			
Number of credits	**Hours in auditorium**	**Total hours**	**Self-training hours**	**Weekly hours**
3	4/28	90	58	2
Grading Procedure	**EVALUATION STRUCTURE**	**Course content**		
		Theory and application of database concept implementation are considered within the course. Entity – relationship and object definition models are used as formalism for database modeling. Problems of relational database scheme design are emphasized. The algebraical and logical approaches of the query language construction are examined in detail. The problems of database integrity constraints are considered in the context of the relational model. Prerequiisites: Data Structures, Discrete Mathematics, Programming languages, System Programming.		

1. Graduate Program “Management of Information Systems”

Program Supervisor – Doctor of Physical and Mathematical Sciences, Professor Samvel Shoukourian

1.1. Core Courses

Code	Name of the course			Semester
2301/M19	Fundamental Algorithms			1
Lecturer	Candidate of Physical and Mathematical Sciences, Associate Professor A.Kostanyan			
Number of credits	**Hours in auditorium**	**Total hours**	**Self-training hours**	**Weekly hours**
6	64	180	116	4

Grading Procedure	EVALUATION STRUCTURE	Course content
○ Homeworks	4 points (20%)	Analysis of algorithms. Solving recurrences. Master Theorem. Sorting algorithms. Sorting by comparison of keys. Sorting using properties of keys. Order statistics. Dictionary ADT. Closed and open address hashing. Hash functions. Balanced search trees: *AVL* trees and *Red-black* trees. Data structure augmentation. The greedy approach. Union-Find ADT. Prim’s and Kruskal’s minimum spanning tree algorithms. Dijksta’s shortest paths algorithm. Amortized analysis. Memory management. The dynamic programming method. Matrix-chain multiplication, finding longest common subsequence. *P* and *NP* classes. *NP*-completeness and reducibility. *NP*-complete problems. Approximation algorithms. .
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	
Total grade	20 points (100%)	

Code	Name of the course	Semester
2301/M20	Database performance tuning	1
Lecturer	Candidate of Physical and Mathematical Sciences, Assisitant Professor A Vasilyan	

Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
6	64	180	116	4

Grading Procedure	EVALUATION STRUCTURE	Course content
○ Homeworks	4 points (20%)	Tuning is the activity of making your database system run faster. The capable tuner must understand the internals and [illegible] performance of a database application. We will see that interactions between different levels of the system, e.g., index design and concurrency control, are extremely important, so will require a new optic on database management design as well as introduce new research issues. Our discussion of tuning will range from the hardware to conceptual design, touching on operating systems, transactional subcomponents, index selection, query reformulation, normalization decisions, and the comparative advantage of redundant data.
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	

Code	Name of the course	Semester
2301/M21	Operating Systems	2
Lecturer	Doctor of Physical and Mathematical Sciences, Professor S.K. Shoukourian	

Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
6	64	180	116	4

Grading Procedure	EVALUATION STRUCTURE	Course content
○ O Homeworks	4 points (20%)	This course intended as a general introduction to the techniques used to implement operating systems and related kinds of systems software. Among the topics [illegible] communication); processor scheduling; deadlock prevention, avoidance, and recovery; main-memory management; virtual memory management (swapping, paging, segmentation and page-replacement algorithms); control of disks and other input/output devices; file-system structure and implementation; and protection and security.
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	

Code	Name of the course	Semester
2301/M22	Data Communications and Networks	1
Lecturer	V.Matevosyan	

Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
6	64	180	116	4

Grading Procedure	EVALUATION STRUCTURE	Course content
○ Homeworks	4 points (20%)	This course introduces the student to a broad range of topics fundamental to computer communications. **Topics that will be covered are:**
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	and Networks • Protocols and Protocol Architectures (OSI, TCP/IP) • Data Encoding and Transmission • Data Link Layer (Framing, Error Control, Flow Control, Protocol Examples) • MAC Sublayer (CSMA/CD, Token Ring, FDDI) • Network Layer (Packet Switching, Circuit Switching, Distance Vector Routing, Link State Routing, X25, ATM) • Internet Network Layer (IP Protocol, Subnets, CIDR, ICMP, ARP, RARP) • Routing Protocols (Inter-AS/Intra-AS Routing, RIP, OSPF, BGP) • Transport Layer (connection-oriented/connectionless communications, multiplexing/demultiplexing, TCP, UDP, TCP Flow Control, TCP Connection Management) • Sockets in C • Congestion Control in Data Networks (TCP Congestion Control, TCP AIMD, TCP Slow Start, TCP Fairness, ATM ABR) • Application Layer (HTTP, FTP, SMTP, MIME, DNS) • IP Multicast A network simulator will be used for the programs written by students. The simulator allows to implement some of the algorithms studied during the course. All of the simulator programming will be done in C. Students will also write some simple socket applications.

Code	Name of the course	Semester
2301/M23	Development of Web Based Systems 1	1
Lecturer	Candidate of Technical Sciences, Assistant Professor A.Avagyan	

Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
3	16/16	90	58	2

Grading Procedure	EVALUATION STRUCTURE	Course content
○ O Homeworks	4 points (20%)	The advent of the World Wide Web and the new technologies and standards surrounding it has dramatically changed the way systems are developed and used in organizations.
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	in developing data driven web sites. Students will evaluate a variety of different web development approaches and architectures, including the common gateway interface model, Java. A variety of alternative development approaches are compared, looking at issues such as the development environment, and the security, performance, scalability, and maintainability of systems developed with the different approaches. The class will be divided into student teams. Each team will implement a small system using one of the supported technologies and evaluate their experience. Students should have the ability to build a simple data driven web sites. There will be light programming used as examples of how to build dynamic web pages. Assignments will include J2EE. During the teaching this course would probably used examples on Linux and MySQL and less on Windows and .NET. The idea of this course is to expose the students to different development approaches for developing dynamic web sites (i.e. web sites whose content is based on a database that is changing). The 3 approaches are Java (i.e. J2EE and all the tools for servlets, JSP, etc), and the Open Source LAMP approach (Linux, MySQL and etc.). Web-Based Systems course concentration is designed for students who are interested in using the web to interface to customers and suppliers. The web has become the standard method of delivering content to both internal and external users, as well as the basis for new XML based standards for interfacing between business processes.

Code	Name of the course	Semester
2301/M23	Development of Web Based Systems 2	2
Lecturer	Candidate of Technical Sciences, Assistant Professor A.Avagyan	

Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
3	16/16	90	58	2

Grading Procedure	EVALUATION STRUCTURE	Course content
○ O Homeworks	4 points (20%)	The World Wide Web has quickly become a repository for much of the digital information in the world. Search engines and related technologies have made that information
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	expanded their business models beyond search in a variety of ways. These technologies have given rise to new business models, opportunities, technical challenges, and complex legal and societal issues. The idea of this course is to expose the students to different development approaches for developing dynamic web sites (i.e. web sites whose content is based on a database that is changing). The 3 approaches are Java (i.e. J2EE and all the tools for servlets, JSP, etc), and the Open Source LAMP approach (Linux, MySQL and etc.). This course will provide an overview of current and future related internet technologies, including how they work, current business models and the implications of future developments. This information should be particularly relevant to anyone who plans to work in media, advertising, publishing, investment banking or technology, or who plans any type of start-up. Topics include alternative page ranking approaches, enterprise search, paid advertisements, on-line auctions, privacy concerns, internationalization, anti-spam efforts, local search, peer-to-peer search, the semantic web, the dark web, and search of blogs and online communities. Web-Based Systems course concentration is designed for students who are interested in using the web to interface to customers and suppliers. The web has become the standard method of delivering content to both internal and external users, as well as the basis for new XML based standards for interfacing between business processes. There will be a final paper/project in which students will pick different technologies of their choice, and either write a paper, conduct a market analysis, or develop a business plan for a new business based on different technologies.

Code	Name of the course			Semester
2301/M24	Managing The Digital Firm			3
Lecturer	Candidate of Economical Sciences, Associate Professor A.Karapetyan			
Number of credits	**Hours in auditorium**	**Total hours**	**Self-training hours**	**Weekly hours**
3	**16/16**	**90**	**58**	**2**

Grading Procedure	EVALUATION STRUCTURE	Course content
○ O Homeworks	4 points (20%)	This course focuses on the use of information technologies to manage and organize the digital firm.
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	degree students practical knowledge of Management Information Systems (MIS) which is currently one of the most crucial and necessary factors in the business environment. The objective of this course is to provide students with computer technology basics including methods for data entry, evaluating the effectiveness of a company's performance and managing a company's digital information assets. At the same time this course also addresses the strategic side of information technology, discussing how information technologies can play a main role in the strategy, business transactions, and structure of modern organizations. Classroom lectures, discussions and case studies are used to discuss problems and important concepts of MIS. The course also aids in the development of the abilities of students for practical work using Microsoft Office software and the Internet.

Code	Name of the course			Semester
2301/M25	Electronic Commerce			3
Lecturer	Candidate of Economical Sciences, Associate Professor A.Karapetyan			
Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
3	16/16	90	58	2

Grading Procedure	EVALUATION STRUCTURE	Course content
○ O Homeworks	4 points (20%)	This course provides an overview of electronic commerce and inter-organizational
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	contemporary organizations. Students will be introduced to all aspects of electronic business, including the use of the Internet, intranets, extranets, and the impact of electronic business on business, government, and consumers.

Code	Name of the course			Semester
2301/M26	Corporate Finance			2
Lecturer	Candidate of Economical Sciences, Assistant Professor H.Mnatsakanyan			
Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
3	16/16	90	58	2

Grading Procedure	EVALUATION STRUCTURE	Course content
○ O Homeworks	4 points (20%)	This course covers the major topics in corporate finance and financial management including estimation of financial assets, which is intermediate topic from foundations of
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	budgeting, cost of capital, dividend policy and basics of portfolio management. The objective of the course is to provide an understanding in both the theory of corporate finance and how it applies to the “real” world. This course included both educational materials and PowerPoint slides for presentation.

Code	Name of the course			Semester
2301/M27	Microeconomics			3
Lecturer	Candidate of Economical Sciences, Associate Professor A.Sargsyan			
Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
6	64	180	116	4

Grading Procedure	EVALUATION STRUCTURE	Course content
○ O Homeworks	4 points (20%)	Course Description: For students whose programs do not include advanced courses in economics. Emphasizes concepts and techniques of economic analysis that are
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	and techniques of microeconomics and then applies them to a number of current research issues in accounting, information systems, management, and marketing (and possibly other areas, depending on the students enrolled). In each case, the course explores the relevant microeconomic theory and some of the empirical literature. This course is an alternative to B30.3334 as the core requirement in microeconomics.

Code	Name of the course			Semester
2301/M28	Marketing			2
Lecturer	K.Galstyan			
Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
3	16/16	90	58	2

Grading Procedure	EVALUATION STRUCTURE	Course content
○ O Homeworks	4 points (20%)	This course provides an overall view of marketing in a customer-driven firm, focusing on essential marketing skills needed by successful managers in all business
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	organizational consumers make decisions, segmenting markets, estimating the economic value of customers to the firm, positioning the firm's offering, effective marketing research, new product development, pricing strategies, communicating with consumers, estimating advertising's effectiveness, and managing relationships with sales force and distribution partners. The course also studies how firms must coordinate these different elements of the marketing mix to insure that all marketing activities collectively forge a coherent strategy. The importance of combining qualitative and quantitative concepts in effective marketing analysis is also examined. The course uses a combination of

		lectures, class discussion, and case analysis. Marketing is a core course and assumes no prior knowledge of marketing. However, there are certain concepts from Firms & Markets that students should have mastered, including: price elasticity of demand, price discrimination, marginal cost, marginal revenue, efficient scale for production capacity, diminishing returns, utility functions and utility curves.

1.2 Electives

Code	Name of the course			Semester
2301/M29	Topics in Programming Languages			2
Lecturer	A.Titanyan			
Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
3	32/32	90	58	2
Grading Procedure	EVALUATION STRUCTURE	Course content		
○ O Homeworks	4 points (20%)	Object constructs of Java: arrays, classes, strings, exceptions. Input and output streams. Reflection. Graphic tools. AWT and SWING libraries. Collections. Multitread Applets and servlets.		
○ Interrrogates	2 points (10%)			
○ Midterm examinations	6 points (30%)			
○ Final examination	8 points (40%)	6 points (30%)		
Total grade	20 points (100%)			

Code	Name of the course			Semester
2301/M30	Database systems implementation			2
Lecturer	Candidate of Physical and Mathematical Sciences, Associate Professor M.Manukyan			
Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
3	32/32	90	58	2
Grading Procedure	EVALUATION STRUCTURE	Course content		
○ O Homeworks	4 points (20%)	Theory and application of implementation for database systems are considered. Course is accompanied by an analysis of known DB		
○ Interrrogates	2 points (10%)			
○ Midterm examinations	6 points (30%)			

○ Final examination	8 points (40%)	systems and includes following topics: • architecture of DBMS • buffer and file control • indexing and B+ - trees, • management of metadata, • query processing, • analysis of known DBMS: Prerequisites: Basics of Database Systems, Fundamentals of Database Systems, Data Structures and Fundamental Algorithms
Total grade	20 points (100%)	

Code	Name of the course			Semester
2301/M31	Business Process Design and Implementation			3
Lecturer	Candidate of Technical Sciences, Assistant Professor G.Sargsyan			
Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
3	16/16	90	58	2

Grading Procedure	EVALUATION STRUCTURE	Course content
○ O Homeworks	4 points (20%)	This course introduces techniques and issues related to the design and development of business process management systems. It demonstrates structures of production
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	maximum availability, reliability, and scalability. Coverage includes: • Fundamentals: types of workflows, and relationship with other technologies. • Key elements of a workflow metamodel including its mathematical formalization. • Architecture of production workflow systems. • Relating workflows with transactions and objects. • The role of standards: Workflow Management Coalition and OMG. • Advanced workflow functions and application topologies. • Business processes implementation using Web Services. Students (2-3 in each group) will work on and deliver a hands-on project using Web Services: this will be the major practical programming project of the course and will cover several technologies.

Code	Name of the course	Semester
2301/M32	Object Oriented Analysis and Design	3
Lecturer	Candidate of Physical and Mathematical Sciences, Associate Professor A.Kostanyan	

Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
3	16/16	90	58	2

Grading Procedure	EVALUATION STRUCTURE	Course content
• O Homeworks	4 points (20%)	The construction of the object oriented analysis and design in the frame of the Unified Process is examined. To illustrate analysis and design models the UML notation
• Interrrogates	2 points (10%)	
• Midterm examinations	6 points (30%)	
• Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	patterns, including the popular "Gang-of-Four" patterns, and the GRASP patterns, which accumulate fundamental principles of responsibility assignment in object design is provided. CASE tools are used to aid in analysis and design.

Code	Name of the course	Semester
2301/M33	Administartion of Unix Operating System	3
Lecturer	R.Khafadaryan	

Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
3	16/16	90	58	2

Grading Procedure	EVALUATION STRUCTURE	Course content
○ O Homeworks	4 points (20%)	A brief history of the Unix operating system: basic utilities (mail, editors); shells; windowing systems; shell programming using Unix tools; networking tools; C programming
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	6 points (30%)
Total grade	20 points (100%)	desktop publishing tools; visualization systems; symbolic algebra tools; and system administration.

Code	Name of the course	Semester
2301/M34	Advanced Dabase Systems	3
Lecturer	Candidate of Physical and Mathematical Sciences, Associate Professor R.Topchyan	

Number of credits	Hours in auditorium	Total hours	Self-training hours	Weekly hours
3	16/16	90	58	2

Grading Procedure	EVALUATION STRUCTURE	Course content
○ O Homeworks	4 points (20%)	To study the internals of database systems as an introduction to research and as a basis for rational performance tuning. The study of internals will concern topics at operating system, and distributed computing research and development. Specific to databases is the support of the notion of transaction: a multi-step atomic unit of work that must appear to execute in isolation and in an all-or-nothing manner. The theory and practice of transaction processing is the problem of making this happen efficiently and reliably.
○ Interrrogates	2 points (10%)	
○ Midterm examinations	6 points (30%)	
○ Final examination	8 points (40%)	
Total grade	20 points (100%)	