

SECRETARÍA ACADÉMICA



DIRECCIÓN DE EDUCACIÓN SUPERIOR

SYNTHESIZED SCHOOL PROGRAM

ACADEMIC UNIT: Escuela Superior de Cómputo

ACADEMIC PROGRAM: Ingeniería en Sistemas Computacionales LEARNING UNIT: Database Selected Topics

LEVEL: III

AIM OF THE LEARNING UNIT:

The student develops information systems through modeling, design, querying and management of large databases.

CONTENTS:

- I. Relational Database Modeling
- II. Semistructured Data-model Basics
- III. Database Systems Implementation
- IV. Further topics

TEACHING PRINCIPLES:

This unit will be tackled using the learning strategy called case study and the deductive method. Students will be able to reflect and argue about some current topics on large database, then they will develop practical tasks in each period. Activities such as documentary investigation, graphic organizers, brainstorm, guided discussion and oral presentations will be performed to produce tangible software artifacts which exhibit the solution of specific problems (cases) and/or documents which register their research. Teacher must indicate task and activities characteristics, from name to evaluation and dates.

EVALUATION AND PASSING REQUIREMENTS:

This unit will be evaluated using a portfolio of evidences, which is composed by: formative and cumulative evaluation, and co-evaluation and self-evaluation rubrics.

Other means to pass this Unit of Learning:

- Evaluation of acknowledges previously acquired, with base in the issues defined by the academy.
- Official recognition by either another IPN Academic Unit of the IPN or by a national or international external academic institution besides IPN.

REFERENCES:

- Date, C.J. (2001). Introducción a los Sistemas de Bases de Datos (7^a Ed.). México: Ed. Pearson Educación de México. ISBN: 9684444192.
- Elmasri R., Navathe S. B. (2007). Fundamentos de Sistemas de Bases de Datos (5^a Ed.). España: Ed. Pearson/Addison Wesley. ISBN: 8478290850.
- García-Molina H., Ullman J. D., Widom J. (2009). Database Systems: The Complete Book (2^a Ed.). USA: Ed. Pearson/Prentice Hall. ISBN: 0131873253.
- Hoffer J. A., Prescott M., Topi H. (2009). Modern Database Management (9^a Ed.). USA: Ed. Pearson/Prentice Hall. ISBN: 0136003915.
- Ramakrishnan R., Gehrke J. (2007). Sistemas de Gestión de Bases de Datos (3^a Ed.). España: Ed. McGraw-Hill/Interamericana de España. ISBN: 8448156382.



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DIRECCIÓN DE EDUCACIÓN SUPERIOR

ACADEMIC UNIT: Escuela Superior de Cómputo

ACADEMIC PROGRAM: Ingeniería en Sistemas Computacionales

LATERAL OUTPUT: Analista Programador de Sistemas de Información

FORMATION AREA: Professional.

LEARNING UNIT: Database Selected Topics

TYPE OF LEARNING UNIT: Theorical - Practical, Optative. **VALIDITY:** August, 2011

LEVEL: III

CREDITS: 7.5 TEPIC - 4.39 SATCA

MODALITY: Presence.

ACADEMIC AIM

This learning unit helps students to develop their investigation, collaborative work, leadership, responsibility, ethics, and problem-solving skills. Likewise, it deals with analysis and design of systems, information abstraction, and programming in depth. Data structures, Databases, Structured Algorithmic and Programming and Software Engineering are antecedents of this unit and Terminal Work is its consequent.

AIM OF THE LEARNING UNIT:

The student develops information systems through modeling, design, querying and management of large databases.

CREDITS HOURS LEARNING UNIT DESIGNED BY: AUTHORIZED BY: Comisión de **THEORETICAL CREDITS / WEEK: 3.0** Programas Académicos del Consejo Academia de Ingeniería de Software General Consultivo del IPN. 2011 **PRACTICAL CREDITS / WEEK: 1.5 REVISED BY:** THEORETICAL HOURS / SEMESTER: Dr. Flavio Arturo Sánchez Garfias 54 Subdirección Académica Ing. Rodrigo de Jesús Serrano **PRACTICAL HOURS / SEMESTER: 27 APPROVED BY:** Domínguez Secretario Técnico de la Comisión de AUTONOMOUS LEARNING HOURS: Ing. Apolinar Francisco Cruz Lázaro **Programas Académicos** 54 Presidente del CTCE. **CREDITS HOURS / SEMESTER: 81**



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DIRECCIÓN DE EDUCACIÓN SUPERIOR

LEARN	ING UNIT: Database Selected Topics			l	PAGE: 3	OUT OF 9		
THEMA	HEMATIC UNIT: 1 TITLE: Relational Database Modeling							
The stuc	UNIT OF COMPETENCE The student designs software systems through relational data-model							
No.	CONTENTS	Teach instru HOI	er led- uction URS	Auton Lear HO	omous ming URS	REFERENCES KEY		
		т	Р	т	Р			
1.1 1.1.1. 1.1.2 1.1.3 1.1.4	Relational model basics Attributes Domains Schemas Keys	0.5		1.0	2.0	1C, 5B, 6B		
1.1.5 1.2 1.2.1 1.2.2 1.2.3 1.3	I uples Relational algebra Set operations on relations Combining operations to form queries Naming and renaming Relational database design	0.5	1.5	2.0	2.0			
1.3.1 1.3.2 1.3.3 1.3.4 1.3.5 1.4	Functional dependencies First normal form Second normal form Third normal form Other normal forms SQL basics	0.5	1.5	2.0	2.0			
1.4.1 1.4.2 1.4.3 1.4.4 1.4.5 1.4.6 1.4.7 1.4.8	Defining a relation schema Database modifications Simple queries Subqueries Aggregation operators Grouping Having clauses Transactions	0.5	1.5	2.0	2.0			
	Subtotals:	2.0	4.5	7.0	8.0			
				<u> </u>	1	<u>I</u>		

TEACHING PRINCIPLES

This thematic unit must begin with a framing of the course and the formation of teams. It will be tackled using the learning strategy called case study and the deductive method, which consolidate the following learning techniques: documentary investigation, graphic organizers, brainstorm, guided discussion, oral presentations, problem-solving and practice development, which in turn, support activities such as normalization, relational algebra and SQL exercises, and the final work.

LEARNING	EVALUATION
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Diagnostic test	
Project Portfolio:	
Normalization exercises	5%
Relational algebra exercises	5%
SQL exercises	5%
Team oral presentation.	5%
Reports of practicals	5%
Final work.	35%
Self-Evaluation rubric	5%
Cooperative Evaluation rubric	5%
Written Learning Evidence	30%



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LEARNING UNIT:

Database Selected Topics

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THEMA	THEMATIC UNIT: II T ITLE: Semistructured Data-model Basics							
-	UNIT OF COMPETENCE							
The stu	dent designs software systems t	nrough semistructured	data-mo	odel	1		1	
No.	CONTENTS		Teacher led- instruction HOURS		Autonomous Learning HOURS		REFERENCES KEY	
			Т	Р	т	Р		
2.1 2.1.1 2.1.2	The semistructured data-model Semistructured data XML		1.0 1.5		1.0 3.0		3B	
2.1.3 2.1.4	Document Type Definitions (DT XML schema	D)						
2.2 2.2.1	Programming languages for XM XPath	1L	1.5	3.5	3.0	4.0		
2.2.2	Extensible Stylesheet Languag	۵						
2.2.5		Subtotale:	4.0	35	7.0	4.0		
	I			FS	7.0	4.0		
This the consolid develop modelin	This thematic unit will be tackled using the learning strategy called case study and the deductive method, which consolidate the following learning techniques: communication, problem-solving, collaborative work, negotiation, development and evaluation of several solutions, and practice development, which in turn, support activities such as modeling, programming, and the final work.							
		LEARNING EV	ALUATI	ON				
Projec	t portfolio:	400/						
Nodel	Ing exercises	10%						
Programming exercises 10%								
Final work 35%								
Self-E	valuation rubric	5%						
Coope	erative Evaluation rubric	5%						
Writter	n Learning Evidence	30%						



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LEARNING UNIT:

Database Selected Topics

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THEMATIC UNIT: III TITLE: Database Systems Implementation						ms Implementation	
The stu	UNIT OF COMP	PETENCE	E	4			
No.	No. CONTENTS		Teacher led- instruction HOURS		omous ning JRS	REFERENCES KEY	
		т	Р	т	Р		
3.1 3.1.1 3.1.2 3.1.3	Index structures Index-Structure Basics B-trees Hash tables	0.5 0.5		1.0 2.0		1C, 5B, 3B, 6B	
3.1.4 3.2 3.2.1 3.2.2	Multidimensional indexes Query execution Scanning Hashing	1.0		2.5			
3.2.3 3.2.4 3.3 3.3.1 3.3.2	Sorting Indexing Query optimization Algebraic laws for improving query plan Estimating the cost of operations	1.0	3.0	2.5	4.0		
3.3.3 3.3.4 3.4 3.4.1 3.4.2	Order of joins Concurrency control Serial and Serializable schedules Enforcing serializability by locks	1.0		1.0			
3.4.5 3.5 3.5.1 3.5.2	Locking systems with several lock modes Transaction management Serializabiliyt and Recoverability Deadlocks	1.0		1.0			
	Subtotals:	5.0	3.0	10.0	4.0		
TEACHING PRINCIPLES This thematic unit will be tackled using the learning strategy called case study and the deductive method, which consolidate the following learning techniques: problem-solving, decision-making, creation of plans and viable solutions, collaborative work, respect to different opinions, tolerance and practice development, which in turn, support activities such as oral presentation, and programs development.							
	LEARNING EVALUATION						
Project Oral pro	portfolio: esentations. 5%						

Oral presentations.	5%
Exercises.	10%
Report of practicals	10%
Programs	35%
Self-Evaluation rubric	5%
Cooperative Evaluation rubric	5%
Written Learning Evidence	30%



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Database Selected Topics

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THEMA	THEMATIC UNIT: IV TITLE: Further topics					
The stu	UNIT OF COM	PETENC	E Sereh lin		h	
No.	 student comes to conclusions regarding topics through curr conclusions regarding topics through curr contents 		Teacher led- instruction HOURS		omous omous ning JRS	REFERENCES KEY
		т	Р	т	Р	
4.1 4.1.1 4.1.2	Database Systems and the Internet The architecture of a search engine Identifying Important pages	2.5		7.0		3B
4.2 4.2.1 4.2.2 4.2.3	Specialty databases Object-Oriented Database Logic-based database Geographic database	2.5		7.0		
	Subtotals:	5.0	0.0	14.0	0.0	
TEACHING PRINCIPLES This thematic unit will be tackled using the learning strategy called case study and the deductive method, which consolidate the following learning techniques: analysis, line of argument, decision-making through conversation and debate, critical thinking, communication, respect to different opinions, and tolerance.						
	LEARNING EVA	LUATIO	ON			
Project portfolio: Written reports 25% Oral presentations 25% Self-Evaluation rubric 5% Cooperative Evaluation rubric 5% Written Learning Evidence 40%						



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RECORD OF PRACTICALS

No.	NAME OF THE PRACTICAL	THEMATIC UNITS	DURATION	ACCOMPLISHMENT LOCATION			
1	Implementation of a relational database.	I	2.0	Computer Labs.			
2	Database modification.	I	2.0				
3	Queries and subqueries.	I	2.5				
4	Aggregation and grouping operators, and having statement.	I	3.0				
5	Transactions.	I	3.0				
6	Information integration.	Ш	3.5				
7	Queries with XQuery.	Ш	4.0				
8	Query processing.	Ш	3.5				
9	Query optimization.	Ш	3.5				
		TOTAL OF HOURS	27.0				
EVALUATION AND PASSING REQUIREMENTS:							

The practical worth 5% in Unit I and Unit II and 10% in Unit III. The practical are considered mandatory to pass this unit of learning.



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PERIOD	UNIT		EVALUATION TERMS			
1	I	Continuous evaluation	70%			
		Written learning evidence	30%			
1	II	Continuous evaluation	70%			
		Written learning evidence	30%			
2	Ш	Continuous evaluation	70%			
		Written learning evidence	30%			
3	IV	Continuous evaluation	60%			
		Written learning evidence	40%			
		The learning unit I is 10% wort	h of the final score.			
		The learning unit II is 30% wor	th of the final score.			
		The learning unit III is 30% wo	rth of the final score.			
		The learning unit IV is 30% worth of the final score.				
		Other means to pass this Lear	ning Unit:			
		 Evaluation of acknowledges previously acquired, with base in the issues defined by the academy. 				
		 Official recognition by national or international 	either another IPN Academic Unit of the IPN or by a al external academic institution besides IPN.			
		If accredited by Special Asses	esment or a certificate of proficiency, it will be based on academy on a previous meeting for this purpose.			

KEY	В	С	REFERENCES
1		Х	Date, C.J. (2001). <i>Introducción a los Sistemas de Bases de Datos</i> (7 ^a Ed.). México: Ed. Pearson Educación de México. ISBN: 9684444192
2		Х	Elmasri R., Navathe S. B. (2007). <i>Fundamentos de Sistemas de Bases de Datos</i> (5 ^ª Ed.). España: Ed. Pearson/Addison Wesley. ISBN: 8478290850
3	Х		García-Molina H., Ullman J. D., Widom J. (2009). <i>Database Systems: The Complete Book</i> (2 ^a Ed.). USA: Ed. Pearson/Prentice Hall. ISBN: 0131873253
4	х		Hoffer J. A., Prescott M., Topi H. (2009). <i>Modern Database Management</i> (9 ^a Ed.). USA: Ed. Pearson/Prentice Hall. ISBN: 0136003915
5	Х		Ramakrishnan R., Gehrke J. (2007). <i>Sistemas de Gestión de Bases de Datos</i> (3 ^a Ed.). España: Ed. McGraw-Hill/Interamericana de España. ISBN: 8448156382
6	Х		Silberschatz A., Korth H. F., Sudarshan S. (2007). <i>Fundamentos de Diseño de Bases de Datos</i> (5 ^a Ed.). España: Ed. McGraw-Hill/Interamericana de España. ISBN: 8448146441



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DIRECCIÓN DE EDUCACIÓN SUPERIOR

TEACHER EDUCATIONAL PROFILE PER LEARNING UNIT

1. GENERAL INFORMATION

ACADEMIC UNIT: Escuela Superior de Cómputo							
ACADEMIC PROGRAM:	Ingeniería en Sistema	LEVEL:					
FORMATION AREA:	Institutional Basic Scientific		Professional	Terminal and Integration			
ACADEMY: Ingeniería de Software LEARNING UNIT: Database Selected Topics							
SPECIALTY AND ACADEMIC REQUIRED LEVEL: Masters Degree or Doctor in Computer Science.							

2. AIM OF THE LEARNING UNIT:

The student develops information systems through modeling, design, querying and management of large databases.

3. PROFESSOR EDUCATIONAL PROFILE:

KNOWLEDGE	PROFESSIONAL EXPERIENCE	ABILITIES	APTITUDES
 Relational data-model. Semistructured data-model. Structured programming. Software project development. Database Management Systems. SQL. MEI. English. 	 A year in information systems design. A year in database system implementation. Two years in group management and collaborative work. A year as bachelor degree teacher. 	 Analysis and synthesis. Information abstraction. Programming. Leadership. Decision making. Problem resolution. Group managing. Good speaker. Didactic skill. Application of MEI. 	 Responsible. Honest. Respectful. Tolerant. Assertive. Collaborative. Participative. Creative.

DESIGNED BY

REVISED BY

AUTHORIZED BY

Dra. Lorena Chavarría Báez Ing. Nancy Ocotitla Rojas M. en C. Euler Hernández Contreras Dr. Flavio Arturo Sánchez Garfias Subdirector Administrativo Ing. Apolinar Francisco Cruz Lázaro Director

Date:2011