

INSTITUTO POLITÉCNICO NACIONAL
SECRETARÍA ACADÉMICA
DIRECCIÓN DE EDUCACIÓN SUPERIOR



SYNTHESIZED SCHOOL PROGRAM

ACADEMIC UNIT: Escuela Superior de Cómputo

ACADEMIC PROGRAM: Ingeniería en Sistemas Computacionales

LEARNING UNIT: Data Mining

LEVEL: III

AIM OF THE LEARNING UNIT :

The student designs a decision support system (DSS) through OLAP technologies, data warehouse and data mining.

CONTENTS:

- I. Introduction.
- II. Architecture and data warehouse development.
- III. Data Models and OLAP (*Online Analytical Processing*).
- IV. Knowledge Discovery.

TEACHING PRINCIPLES:

The professor will apply a Projects-Based learning process, through analogical methods using analysis techniques, technical data, charts, cooperative presentation, exercise solving and the production of the learning evidences. Moreover, an autonomous learning will be encouraged by the development of a final project.

EVALUATION AND PASSING REQUIREMENTS:

The program will evaluate the students in a continuous formative and summative way, which will lead into the completion of project portfolio. Some other assessing methods will be used, such as revisions, practical's, class participation, exercises, learning evidences and a final project.

REFERENCES:

- Elmasri, R. Navathe, S. B. (2007). Fundamentos de Sistemas de Bases de Datos. (Quinta Edición). Madrid España: Pearson/Addison Wesley ISBN: 978-84-7829-085-7.
- Ferri, R. C. Ramírez, Q. M.J. Hernández, O. J.(2004). Introducción a la minería de datos. (Primera Edición). Madrid España: Pearson Prentice-Hall. ISBN: 978-84-205-4091-7
- Kimball, R. Ross, M. Thornthwaite, W. Mundy, J. Becker, B. (2008). The Data Warehouse Lifecycle Toolkit (2nd Edition). USA Indianapolis: Wiley Publishing Inc. ISBN: 978-0470149775
- Pérez, L. C, Santín, G. D. (2007). Minería de Datos. Técnicas y Herramientas. Madrid España: Editorial Thompson. ISBN: 9788497324922
- Ricardo, C. M.(2009). Bases de Datos. México D.F.: Mc Graw Hill. ISBN: 978-970-10-7275-2.



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ACADEMIC UNIT: Escuela Superior de Cómputo

ACADEMIC PROGRAM: Ingeniería en Sistemas Computacionales

LATERAL OUTPUT: Analista Programador de Sistemas de Información

FORMATION AREA: Profesional

MODALITY: Presencial

LEARNING UNIT: Data Mining.

TYPER OF LEARNING UNIT: Theoretical – Practical, Optative.

VALIDITY: Agosto 2011

LEVEL: III

CREDITS: 7.5 TEPIC – 4.39 SATCA

ACADEMIC AIM

Furthermore, this program to provide the knowledge to design decision support system, being caused the independent learning by means of the use of tools and methods; developing abilities to use different technologies for developing a data warehouse and data mining for knowledge discovery at database. It contributes to the debit profile reinforcing it integration of the knowledge of other Units of Learning to plan, to negotiate and to foment the analysis skills; designing and coordinating projects in the context of decision support systems and database topics. It dominates the practical and methodological principles, aspects for the construction of systems. Decision making, solution of problems, assertive communication, and creative, strategic thought. This unit has the units Database as antecedents.

AIM OF THE LEARNING UNIT:

The student designs a decision support system (DSS) trough OLAP technologies, data warehouse and data mining.

CREDITS HOURS

THEORETICAL CREDITS/WEEK:3.0

PRACTICAL CREDITS/WEEK:1.5

**THEORETICIAN
HOURS/SEMESTER:**54

PRACTICAL HOURS/SEMESTER:27

AUTONOMUS LEARNING HOURS: 54

CREDITS HOURS/SEMESTER:81

LEARNING UNIT DESIGNED BY: Academia de Ingeniería de Software

REVISED BY:

Dr. Flavio Arturo Sánchez Garfias
Subdirección Académica

APPROVED BY:

Ing. Apolinar Francisco Cruz Lázaro
Presidente del CTCE.

AUTHORIZED BY: Comisión de Programas Académicos del Consejo General Consultivo del IPN. 2011

Ing. Rodrigo de Jesús Serrano Domínguez
Secretario Técnico de la Comisión de Programas Académicos

THEMATIC UNIT: I			TITLE: Introduction			
UNIT OF COMPETENCE						
TThe student relates kinds of decision support systems through data warehouse and data mart architectures.						
No.	CONTENTS	Teacher led-instruction HOURS		Autonomous Learning HOURS		REFERENCES KEY
		T	P	T	P	
1.1	Introduction to Decision Support Systems	0.5		1.5		1B,5C
1.1.1	Decision Support System (DSS).					
1.1.2	Decision support system taxonomy.	2.5		3.0	1.5	
1.1.3	Architectural , Hardware and Platforms for decision support system.					
1.2	Data Warehouse/Data Mart Definition	2.0		3.0	1.5	
12.1	Characteristics of data warehouse					
1.2.2	Data Warehouse/Data Mart Architectures					
1.2.3	Data WareHouse Applications					
	Subtotals:	5.0	0.0	7.5	3.0	
TEACHING PRINCIPLES						
This Thematic Unit must begin with a framing of the course and the formation of teams. Will be Projects-Based learning strategy, trough analogical method, with the techniques of elaboration of charts, concept mapping, exhibition in team, practical and production of learning evidence and the accomplishment of a project proposal.						
LEARNING EVALUATION						
<div>Diagnostic Test</div> <div>Project Portfolio:</div> <div>Charts5%</div> <div>Concept Mapping5%</div> <div>Cooperative Presentation10%</div> <div>Reports of practicals20%</div> <div>Proposal of project20%</div> <div>Self-Evaluation Rubrics5%</div> <div>Cooperative Evaluation Rubrics5%</div> <div>Written Learning Evidence30%</div>						

THEMATIC UNIT: II		TITLE: Architecture and data warehouse development																					
UNIT OF COMPETENCE																							
The student compares different methodologies, architectural and ETL (Extract, transform and load) tools through design data warehouse methodologies.																							
No.	CONTENTS	Teacher led- instruction HOURS		Autonomous Learning HOURS		REFERENCES KEY																	
		T	P	T	P																		
2.1	Data Warehouse Design	0.5		1.5	1.0	9B, 8C, 2B, 4B																	
2.2	Data warehouse Architecture Reference.	1.5	0.5	1.5	2.0																		
2.3	Typical Functionality of a Data Warehouse.	1.5	0.5	1.5	1.0																		
2.4	An introduction to ETL Functions.	1.0	0.5	1.5	1.0																		
2.5	Problems and Open Issues in Data Warehouses.	0.5		1.0	1.0																		
2.5.1	Oracle-Sunopsis.																						
	Subtotals:	5.0	2.0	7.5	6.0																		
TEACHING PRINCIPLES																							
Will be projects-Based learning strategy, through analogical method, through analogical method, with the techniques of elaboration of charts, concept mapping, exhibition in team, advance of the project, practical and production of learning evidences.																							
LEARNING EVALUATION																							
<table><tr><td>Project Portfolio:</td><td></td></tr><tr><td>Report of Practicals</td><td>10%</td></tr><tr><td>Concept Mapping</td><td>5%</td></tr><tr><td>Cooperative Presentation</td><td>5%</td></tr><tr><td>Advance of the Project</td><td>30%</td></tr><tr><td>Self-Evaluation Rubrics</td><td>5 %</td></tr><tr><td>Cooperative Evaluation Rubrics</td><td>5%</td></tr><tr><td>Writing Learning Evidence</td><td>40%</td></tr></table>								Project Portfolio:		Report of Practicals	10%	Concept Mapping	5%	Cooperative Presentation	5%	Advance of the Project	30%	Self-Evaluation Rubrics	5 %	Cooperative Evaluation Rubrics	5%	Writing Learning Evidence	40%
Project Portfolio:																							
Report of Practicals	10%																						
Concept Mapping	5%																						
Cooperative Presentation	5%																						
Advance of the Project	30%																						
Self-Evaluation Rubrics	5 %																						
Cooperative Evaluation Rubrics	5%																						
Writing Learning Evidence	40%																						

THEMATIC UNIT: III			TITLE: Data Models and OLAP			
UNIT OF COMPETENCE						
The student compares mainly multidimensional models through their characteristics and OLAP (Online Analytical Processing) operations.						
No.	CONTENTS	Teacher led-instruction HOURS		Autonomous Learning HOURS		REFERENCES KEY
		T	P	T	P	
3.1	Introduction, Definitions, and Terminology	1.5		2.0	1.5	2B, 5C, 7C
3.1.1	Data Cube					
3.1.2	OLAP					
3.1.3	OLAP vs OLTP (<i>OnLine Transaction Processing</i>)					
3.2	Data Modeling for Data Warehouses.	1.0		3.0	1.5	
3.2.1	Relational Model.					
3.2.2	Dimensional OLAP Model.					
3.2.3	Star Schema, Snowflake Schema and others.					
3.3	Data Cube Operators.	1.5	1.0	3.0	1.5	
3.4	Multidimensional data cube examples.	1.0	1.0	1.0	1.5	
	Subtotals:	5.0	2.0	9.0	6.0	
TEACHING PRINCIPLES						
Will be projects-Based learning strategy, through analogical method, through analogical method, with the techniques of elaboration of charts, concept mapping, exhibition in team, advance of the project, practical and production of learning evidences.						
LEARNING EVALUATION						
Project Portfolio:						
Report of Practical		10%				
Charts		5%				
Concept Mapping		5%				
Advance of the Project		30%				
Self-Evaluation Rubrics		5%				
Cooperative Evaluation Rubrics		5%				
Writing Learning Evidence		40%				

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THEMATIC UNIT: IV			TITLE: Knowledge Discovery				
UNIT OF COMPETENCE							
The student designs a data mining system trough knowledge discovery process.							
No.	CONTENTS	Teacher led-instruction HOURS		Autonomous Learning HOURS		REFERENCES KEY	
		T	P	T	P		
4.1 4.1.1 4.1.2	Introduction Basic Concepts Data Mining and Knowledge Discovery	2.0	0.5	2.0		3B, 8C, 6C	
4.2 4.3 4.3.1 4.3.2 4.3.3 4.3.4 4.3.5	Knowledge Discovery Process Data Mining Techniques Pattern extraction issues Statistical Methods Association Rules Decision Trees Artificial Neural Networks	3.0	1.0	4.0	4.0		
4.4 4.4.1 4.4.2 4.4.3	Tools SPSS Clementine SAS Enterprise Miner Weka	1.0	0.5	3.0	2.0		
Subtotals:		6.0	2.0	9.0	6.0		
TEACHING PRINCIPLES							
Techniques of elaboration of exercise-solving, cooperative presentation, practical and learning evidence, the production of the learning evidences and the presentation of the final project.							
LEARNING EVALUATION							
Project Portfolio:							
Report of Practical		10%					
Exercise-solving		5%					
Concept Mapping		5%					
Final Project		30%					
Self-Evaluation Rubric		5%					
Cooperative Evaluation Rubrics		5%					
Writing Learning Evidence		40%					



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LEARNING UNIT:

Data Mining

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RECORD OF PRACTICALS

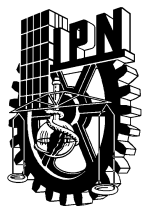
No.	NAME OF THE PRACTICAL	THEMATIC UNITS	DURATION	ACCOMPLISHMENT LOCATION
1	Multi-database Architecture.	I	3.0	Computers Labs
2	Association Rules Generator System.	II	8.0	
3	Weka Tools.	III	8.0	
4	Decision Support System.	IV	8.0	
		TOTAL OF HOURS	27.0	

EVALUATION AND PASSING REQUIREMENTS:

The practicals worth 20% in thematic unit I.

The practicals worth 10% in thematic units II, III and IV.

Practicals are considered mandatory to pass this unit learning.



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LEARNING UNIT:

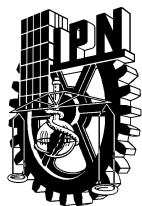
Data Mining

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PERIOD	UNIT	EVALUATION TERMS
1	I	Continuous evaluation 70% Written Learning Evidence 30%
2	II	Continuous evaluation 60% Written Learning Evidence 40%
	III	Continuous evaluation 60% Written Learning Evidence 40%
3	IV	Continuous evaluation 60% Written Learning Evidence 40%
<p>The learning Unit I is 20% worth of the final score. The learning Unit II is 20% worth of the final score. The learning Unit III is 30% worth of the final score. The learning Unit IV is 30% worth of the final score.</p> <p>If accredited by Special Assessment or a certificate of proficiency, it will be based on guidelines established by the academy on a previous meeting for this purpose.</p>		

KEY	B	C	REFERENCES
1	X		Efrem, G. M.(2002). <i>Decision Support and Data Warehouse Systems</i> . USA: Mc Graw Hill Education. ISBN: 978-0070486843
2	X		Elmasri, R. Navathe, S. B. (2007). <i>Fundamentos de Sistemas de Bases de Datos</i> . (Quinta Edición). Madrid España: Pearson/Addison Wesley ISBN: 978-84-7829-085-7.
3	X		Ferri, R. C. Ramírez, Q. M.J. Hernández, O. J.(2004). <i>Introducción a la minería de datos</i> . (Primera Edición). Madrid España:Pearson Prentice-Hall. ISBN: 978-84-205-4091-7
4	X		Kimball, R. Ross, M. Thornthwaite, W. Mundy, J. Becker, B. (2008). <i>The Data Warehouse Lifecycle Toolkit</i> (2nd Edition). USA Indianapolis: Wiley Publishing Inc. ISBN: 978-0470149775
5		X	Mannino, M. V. (2007). <i>Administración de bases de datos, diseño y desarrollo de aplicaciones</i> . (Tercera Edición). México: Mc Graw Hill Interamericana. ISBN: 978-970-10-6109-1.
6		X	Pérez, L. C, Santín, G. D. (2007). <i>Minería de Datos. Técnicas y Herramientas</i> . Madrid España: Editorial Thompson. ISBN: 9788497324922
7		X	Ramakrishnan, R. Gehrke, J.(2007). <i>Sistemas de Gestión de Bases de Datos</i> . (Tercera Edición). Madrid España: McGraw-Hill/Interamericana de España. ISBN: 978-84-481-5638-1
8		X	Ricardo, C. M.(2009). <i>Bases de Datos</i> . México D.F.: Mc Graw Hill. ISBN: 978-970-10-7275-2.
9	X		Vincent, R. (2008). <i>Building a Data Warehouse: With Examples in SQL Server</i> . (Expert's Voice). (First Edition). USA Berkeley CA: Apress. ISBN: 978-1590599310



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TEACHER EDUCATIONAL PROFILE PER LEARNING UNIT

1. GENERAL INFORMATION

ACADEMIC UNIT: Escuela Superior de Cómputo

ACADEMIC PROGRAM: Ingeniería en Sistemas Computacionales LEVEL III

FORMATION AREA:

Institutional	Basic Scientific	Professional	Terminal and Integration
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ACADEMY: Software Engineering LEARNING UNIT: Data Mining.

SPECIALTY AND ACADEMIC REQUIRED LEVEL: Masters Degree or Doctor in Computer Science

2. AIM OF THE LEARNING UNIT:

The student designs a decision support system (DSS) through OLAP technologies, data warehouse and data mining.

3. PROFESSOR EDUCATIONAL PROFILE:

KNOWLEDGE	PROFESSIONAL EXPERIENCE	ABILITIES	APTITUDES
<ul style="list-style-type: none">Multidimensional Data ModelsOLAPDistributed SystemsSQL StandardArtificial Intelligence TechniquesKnowledge of the Institutional Educational ModelEnglish Language	<ul style="list-style-type: none">A year designs computational systemsA year experience develop database systemsTwo Years working in groups and work collaborative.A year experience in the Institutional Educational Model.	<ul style="list-style-type: none">Analysis and synthesis.Leadership.Decision Making.Problems resolution.Applications of Institutional Educational Model.Develop tools for maker decision.	<ul style="list-style-type: none">Responsible.Honest.Respectful.Tolerant.Assertive.Colaborative.Participative.

DESIGNED BY

REVISED BY

AUTHORIZED BY

M. en C. Euler Hernández Contreras
COORDINATING PROFESSOR

Dr. Flavio Arturo Sánchez Garfias
Subdirector Académico

Ing. Apolinar Francisco Cruz Lázaro
Director

Dr. Benjamín Luna Benoso
COLLABORATING PROFESSORS

Date: 2011