

## SECRETARÍA ACADÉMICA



## DIRECCIÓN DE EDUCACIÓN SUPERIOR

## SYNTHESIZED SCHOOL PROGRAM

ACADEMIC UNIT:	Escuela Superior de Cómputo			
ACADEMIC PROGRAM:	Ingeniería en Sistemas Computacionales.			
LEARNING UNIT:	Computer animation	LEVEL: III		

#### AIM OF THE LEARNING UNIT:

The student designs algorithms on computer vision and graphics systems based on computer animation techniques.

#### CONTENTS:

- I. Computer Animation Fundamentals.
- II. Character Generation.
- III. Special effects programming.

#### **TEACHING PRINCIPLES:**

The learning unit will be addressed from the project-oriented learning strategy, the teacher apply the heuristic method, with which it carried out learning activities that will guide the development of skills of abstraction, analysis and design of efficient algorithms, using theoretical and practical tools, such is the case for the implementation of computer programs that demonstrate the concepts of the unit. The activities done in class to encourage students some techniques, such as collaborative, participatory, brainstorming, graphic organizers, inquiry documents, worksheets, supplementary statement of issues, discussion and directed the execution of a project software. It is the responsibility of the teacher decide the features of the project and the programs implemented by fixing the time of preparation and delivery.

#### **EVALUATION AND PASSING REQUIREMENTS:**

This learning unit will be assessed from the portfolio of evidence, which is made up of: formative assessment, summative and self-assessment and peer assessment 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:**

- Erleben, K. (2005). Physics Based Animation (Graphics). (2a Ed.). EUA: Charles River Media. ISBN: 978-1584503804.
- Foley, J.D. van Dam, A. Feiner, S.K. Hughes, J.F. (2012). Computer Graphics: Principles and Practice, (3ra. Ed.). EUA: Addison-Wesley. ISBN (13): 978-0321399526.
- Foley, J.D. van Dam, A. Feiner, S.K. Hughes, J.F. Phillips, R.L. (1994). Introduction to Computer Graphics (2a Ed.). EUA: Addison-Wesley. ISBN (13): 978-0201609219.
- Hearn, D. Baker, M.P. (1995) Gráficas por computadora (2<sup>a</sup> Ed.) México: Prentice-Hall Hispanoamericana. ISBN (10): 968-880-482-7.
- Rogers, D.F. Adams, J.A. (1990). Mathematical Elements for Computer Graphics (2a Ed.). EUA: McGraw-Hill. ISBN (13): 978-0070535305.



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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. MODALITY: Presence. LEARNING UNIT: Digital processing of Voice and Image. TYPE OF LEARNING UNIT: Theorical - Practical, Optative. VALIDITY: August, 2011. LEVEL: III. CREDITS: 7.5 Tepic, 4.39 SATCA

## ACADEMIC AIM

This learning unit contributes to the profile of graduates of Engineering in Computer Systems to develop the skills to design efficient algorithms in computer animation for the solution of practical problems that require visual display solutions. It also develops strategic thinking, creative thinking, collaborative and participatory and assertive communication.

Requires learning units Analysis of Algorithms, with the ability to program solutions in a high-level language, Data Structure, with the use of appropriate structures to manipulate data efficiently and Computational Theory with the use of tools theory to characterize computational processes.

#### AIM OF THE LEARNING UNIT:

The student designs algorithms on computer vision and graphics systems based on computer animation techniques.

#### **CREDITS HOURS**

THEORETICAL CREDITS / WEEK: 3.0

PRACTICAL CREDITS / WEEK: 1.5

**THEORETICAL HOURS / SEMESTER:** 54

PRACTICAL HOURS / SEMESTER: 27

AUTONOMOUS LEARNING HOURS: 54

81

CREDITS HOURS / SEMESTER:

LEARNING UNIT DESIGNED BY: Academy of Computer Science

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

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



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## **DIRECCIÓN DE EDUCACIÓN SUPERIOR**

LEARNING UNIT:

Computer Animation

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#### THEMATIC UNIT: | **TITLE:** Computer Animation Fundamentals UNIT OF COMPETENCE The student develops the basics of a storyboard for an animation techniques based on Graphic Processing Units (GPU) programming. Teacher led-Autonomous instruction Learning REFERENCES No. CONTENTS HOURS HOURS KEY Т Ρ Т Ρ 2.0 1.1 Fundamentals of graphing. 1.0 4.0 2.0 2C, 3B, 3B, Homogeneous transformations. 5B, 1C 1.1.1 Changes in perspective. 1.1.2 Graphic primitives. 1.1.3 Techniques polygonal rendering of scenes. 1.1.4 Models of color. 1.1.5 1.2 GPU Programming. 2.0 1.0 4.0 2.0 1.2.1 GPU programming model. 1.2.2 Programming tools. 1.3 Generate a storyboard. 1.3.1 Storyboard. 2.0 4.0 2.0 1.0 1.3.2 Enhance the script. Edit the content. 1.3.3 1.3.4 Mounting. 3.0 12.0 Subtotals: 6.0 6.0

#### **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 inductive method, with the techniques of elaboration of charts, technical data and exercise-solving, exhibition in team, practical and production of learning evidence and the accomplishment of a project proposal.

	LEARNING EVALUATION
Diagnostic Test	
Project Portfolio:	
, Technical data	5%
Charts	5%
Exercise-solving	10%
Cooperative Presentation	10%
Report of Practicals	20%
Proposal of project	10%
Self-Evaluation Rubrics	2%
Cooperative Evaluation Rubrics	s 3%
Written Learning Evidence	35%



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## DIRECCIÓN DE EDUCACIÓN SUPERIOR

**Computer Animation** 

LEARNING UNIT:

**PAGE:** 5 **OUT OF** 12

THEMA	EMATIC UNIT: II TITLE: Character Generation						
The stud	ent designs characters in moti	UNIT OF COMPET	ENCE	o compute	er motion t	echniques.	
No.	CONTENTS		Teacher led- instruction HOURS		Autonomous Learning HOURS		REFERENCES KEY
			Т	Р	Т	Р	
2.1 2.1.1 2.1.2 2.1.3 2.1.4	Character development Design Criteria Character Design Background design Staging		3.0	1.5	6.0	3.0	2C, 3B, 3B, 5B, 1C
2.2 2.2.1 2.2.2 2.2.3 2.2.4	Character Movement Structure and proportion Camera movements Physical Activity Animation		3.0	1.5	6.0	3.0	
		Subtotals:	6.0	3.0	12.0	6.0	
Will be p cooperat	projects-Based learning strate ive presentation, advance of the	<b>TEACHING PRINC</b> egy, trough heuristic methon he project, practical and the	IPLES od, with produc	the tecl tion of th	hniques of e learning	charts, ex evidences.	kercise-solving,
		LEARNING EVALU	ATION				
Project F 7 ( ( ( 7 F F S F V	ortfolio: Technical data Charts Compute programs w/report Cooperative Presentation Advance of the Project Report of Practicals Self-Evaluation Rubrics Rubric of Co-Evaluation Written Learning Evidence	5% 5% 10% 10% 20% 10% 2% 3% 35%					



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## DIRECCIÓN DE EDUCACIÓN SUPERIOR

**Computer Animation** 

LEARNING UNIT:

**PAGE:** 7 **OUT OF** 12

THEMA	ATIC UNIT: III TITLE: Special Effects Programming						ts Programming
The stud	lant dagigna computer onimati	UNIT OF COMPE	TENCE	tooboig	upp of appa	nial offecto	
No.	No. CONTENTS		Teacher led- instruction HOURS		Autonomous Learning HOURS		REFERENCES KEY
			Т	Р	Т	Р	-
3.1 3.1.1 3.1.2 3.1.3 3.1.4 3.2 3.2.1 3.2.2	Techniques and types of spe Optical effects Mechanical effects Sound effects Digital Effects Technology and Digital Effec Applications for the developn Basic special effects: fire, wir	niques and types of special effects al effects nanical effects d effects al Effects nology and Digital Effects cations for the development of special effects special effects: fire, wind, rain, liquid		1.5	6.0	3.0	2C, 3B, 3B, 5B, 1C
		Subtotals:	6.0	3.0	12.0	6.0	
Will be p exercise advance	projects-Based learning strate -solving, cooperative presenta of the project.	<b>TEACHING PRIN</b> gy, trough inductive and he ition, practical and learning	CIPLES euristic evidenc	methods e, the pr	, with the oduction o	techniques f the learni	of elaboration of ng evidences and
		LEARNING EVAL	UATION				
Project F 7 ( (	Portfolio: Fechnical Data Charts Computer programs w/report Cooperative Presentation	5% 5% 15% 10%					

Report of Practicals15%Self-Evaluation Rubrics5%

40%

Project Report

Cooperative Evaluation Rubrics 5%



# INSTITUTO POLITÉCNICO NACIONAL SECRETARÍA ACADÉMICA





LEARNING UNIT:

Computer Animation

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## **RECORD OF PRACTICALS**

No.	NAME OF THE PRACTICAL	THEMATIC UNITS	DURATION	ACCOMPLISHMENT LOCATION
1.	Basics of computer animation.	I	9.0	Computer Labs.
2.	Character generation.	Ш	9.0	
3.	Special effects programming.	111	9.0	
		TOTAL OF		
		HOURS	9.0	

## **EVALUATION AND PASSING REQUIREMENTS:**

The practicals are considered mandatory to pass this learning unit.

The practicals worth 20% in thematic unit I.

The practicals worth 10% in thematic unit II. The practicals worth 15% in thematic unit III.



# SECRETARÍA ACADÉMICA



## DIRECCIÓN DE EDUCACIÓN SUPERIOR

LEARNING UNIT:

Digital processing of Voice and Image

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PERIOD	UNIT	EVALUATION TERMS					
1		Continuous evaluation 65% and written learning evidence 35%					
2	II	Continuous evaluation 65% and written learning evidence 35%					
3	III	Continuous evaluation 100%					
		The learning unit I is 30% worth of the final score The learning unit II is 30% worth of the final score The learning unit III is 40% worth of the final score					
		<ul> <li>Other means to pass this Learning Unit:</li> <li>Evaluation of acknowledges previously acquired, with base in the issues defined by the academy.</li> <li>Official recognition by either another IPN Academic Unit of the IPN or by a national or international external academic institution besides IPN.</li> </ul>					

KEY	В	С	REFERENCES
1		Х	Erleben, K. (2005). <i>Physics Based Animation (Graphics)</i> . (2a Ed.). EUA: Charles River Media. ISBN: 978-1584503804.
2		Х	Foley, J.D. van Dam, A. Feiner, S.K. Hughes, J.F. (2012). <i>Computer Graphics: Principles and Practice,</i> (3ra. Ed.). EUA: Addison-Wesley. ISBN (13): 978-0321399526.
3	Х		Foley, J.D. van Dam, A. Feiner, S.K. Hughes, J.F. Phillips, R.L. (1994). <i>Introduction to Computer Graphics</i> (2a Ed.). EUA: Addison-Wesley. ISBN (13): 978-0201609219.
4	х		Hearn, D. Baker, M.P. (1995) <i>Gráficas por computadora</i> (2ª Ed.) México: Prentice-Hall Hispanoamericana. ISBN (10): 968-880-482-7.
5	Х		Rogers, D.F. Adams, J.A. (1990). <i>Mathematical Elements for Computer Graphics</i> (2a Ed.). EUA: McGraw-Hill. ISBN (13): 978-0070535305



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## DIRECCIÓN DE EDUCACIÓN SUPERIOR

## TEACHER EDUCATIONAL PROFILE PER LEARNING UNIT

#### 1. GENERAL INFORMATION

ACADEMIC UNIT:	Esc	Escuela Superior de Cómputo.						
ACADEMIC PROGRAM		Ingeniería en Sist	emas Computacionales	LEVEL III				
FORMATION AREA: Institutional			Basic Scientific	Professional	Te	rminal and ntegration		
ACADEMY: Ciencias	de la (	Computación	LEARNING UNIT: _C	Computer Animatior	1			

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

#### 2. AIM OF THE LEARNING UNIT:

The student designs algorithms on computer vision and graphics systems based on computer animation techniques.

## 3. PROFFESSOR EDUCATIONAL PROFILE:

KNOWLEDGE	PROFESSIONAL EXPERIENCE	ABILITIES	APTITUDES
<ul> <li>Analysis of algorithms.</li> <li>Algorithm design techniques.</li> <li>Computer Animation</li> <li>Programming languages.</li> <li>MEI.</li> <li>English Language</li> </ul>	<ul> <li>One year experience in the analysis of algorithms.</li> <li>One year experience in the use of algorithm design techniques.</li> <li>Two years experience in handling groups and collaborative work.</li> <li>One year experience as a Professor of Higher Education.</li> </ul>	<ul> <li>Analysis and synthesis.</li> <li>Problems resolution.</li> <li>Cooperative.</li> <li>Leadership.</li> <li>Applications of Institutional Educational Model.</li> <li>Decision making.</li> </ul>	<ul> <li>Responsible.</li> <li>Tolerant.</li> <li>Honest.</li> <li>Respectful.</li> <li>Collaborative.</li> <li>Participative.</li> <li>Assertive.</li> </ul>

**DESIGNED BY** 

**REVISED BY** 

AUTHORIZED BY

Rosaura Palma Orozco COORDINATING PROFESOR Dr. Flavio Arturo Sánchez Garfias Subdirector Académico

Ing. Apolinar Francisco Cruz Lázaro Director

Date: 2011