



**A) COURSE**

Course Id:	Course
5689	Computer Aided Design

Class Hours per Week	Lab hours per week	Complementary practices	Credits	Total hour course
0	3	0	3	48 hrs.

**B) GENERAL COURSE INFORMATION:**

	EE (IEA)	ME (IM)	MME (IMA)	EME (IME)	MTE (IMT)
<b>Level:</b>	N.A.	III	III	IV	IV
<b>Course Type (Required/Elective)</b>		Elective	Elective	Elective	Elective
<b>Prerequisite Course:</b>		Drawing in Mechanical Engineering (5690)	Drawing in Mechanical Engineering (5690)	Drawing in Mechanical Engineering (5690)	Drawing in Mechanical Engineering (5690)
<b>CACEI Classification:</b>		IA	IA	IA	IA

**C) COURSE OBJECTIVE**

**At the end of the course, the student will be capable of:**

Know, identify and use the tools of computer-aided drawing , existing as AutoCAD , CATIA , Unigraphics NX or Solidworks . In order for the student to expose their ideas and designs in accordance with international standards drawing.

**D) TOPICS (CONTENTS AND METHODOLOGY)**

1.- Introduction to materials		<b>3 hours</b>
Specific Objective:	<b>Objective 1:</b> The student to know, identify, classify and describe the families of materials and their main applications.	
1.1 Introduction to materials 1.2 Types of materials Actual tendency to use modern materials		
<b>Readings and other resources</b>	Callister, W. Introducción a la Ciencia de Materiales. Reverté. Askeland, Donald R. Ciencia e ingeniería de los materiales. Internacional Thomson Editores. D.F., México, 1998	
<b>Teaching methods</b>	Inductive method: going from general to particular knowledge. Group based learning to cope with basic theoretical knowledge.	
<b>Learning activities</b>	Lab practicing to apply concepts taught during class. It is mandatory to present task reports	



<b>2.- CAD tools for drawing 2D</b>		<b>6 hours</b>
<b>Specific Objective::</b>	That students know and use the CAD commands for 2D drawing and editing.	
2.1 Views and workplanes 2.2 Tools sketched 2D 2.3 Commands 2D editing and properties 2.3.1 Tools to move and rotate Tools 2.3.2 symmetry Tools 2.3.3 scale 2.3.4 rectangular and circular arrangements 2.3.5 Rounding and chamfering 2.3.6 layered Drawing 2.4 Sizing Tools 2.5 Parameterized Drawing and generation block 2.5.1 dimensional parameterization 2.5.2 geometric parameterization 2.6 Building Tables		
<b>Readings and other resources</b>	<u>library resources :</u> [1 ] Mediactive , "Learning AutoCAD 2013 Advanced exercises " AlfaOmega . [2 ] Eduardo Gutierrez Ferney , " AutoCAD 2012: 2 and 3 dimensions: visual guide " AlfaOmega . [3 ] Ellen Finkelstein, " AutoCAD 2007 and AutoCAD LT 2007 bible " , Wiley . [4] K.L. Narayana , P. Kannaiah , K, Venkata Reddy, "Machine drawing" , New Age International Publishers, 3rd.Ed. <u>Electronic resources :</u> AutoCAD video tutorials : <a href="http://www.lynda.com/AutoCAD-training-tutorials/160-0.html">http://www.lynda.com/AutoCAD-training-tutorials/160-0.html</a> AutoCAD video tutorials : <a href="http://www.lynda.com/AutoCAD-LT-tutorials/AutoCAD-2015-Essential-Training/162105-2.html">http://www.lynda.com/AutoCAD-LT-tutorials/AutoCAD-2015-Essential-Training/162105-2.html</a>	
<b>Teaching methods</b>	The student must perform tasks that involve drawings of mechanical elements where they implement each of the topics reviewed in class. The student must develop a project in which the planes of manufacturing and assembly of a mechanical system are involved.	
<b>Learning activities</b>	Professor will design activities that allow the evaluation of StudentOutcomes involved in the course .	

<b>3.-Phases diagram</b>		<b>6 hours</b>
<b>Specific Objective:</b>	For the student to draw the outlines of parts in 2D for the generation of 3D models	
3.1 The sketched 2D 3.2 Technology 3.3 Sequence Sketched 3.4 Guidelines and draft restrictions 3.5 Relations sketches		



<b>Readings and other resources</b>	<p>library resources</p> <p>[1 ] David C. Planchard , " With SolidWorks 2014 Engineering graphics and video instruction : a step by step project based approach " SDC Publications.</p> <p>[2 ] David C. Planchard , "Certified SolidWorks Associate CSWA Exam Guide 2009 : an authorized CSWA exam preparation guide" SDC Publications</p> <p>[3] K.L. Narayana , P. Kannaiah , K, Venkata Reddy, "Machine drawing" , New Age International Publishers, 3rd.Ed.</p> <p>Electronic resources</p> <p>SolidWorks video tutorials : <a href="http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html">http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html</a></p>
<b>Teaching methods</b>	The student must perform tasks that involve drawings of mechanical elements where they implement each of the topics reviewed in class. The student must develop a project in which the planes of manufacturing and assembly of a mechanical system are involved.
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<b>4.- 3D modeling core pieces</b>	<b>8 hours</b>
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<b>Specific Objective:</b>	The student will know , handle and apply the basic commands for drawing and CAD 3D editing .	
4.1 The basic modeling 4.2 Terminology 4.3 Details of the piece 4.4 Booleans 4.5 mopping up and revolution Drafted 4.6 on previously created faces 4.7 View Options 4.8 drilling operations 4.9 Circular patterns and lines of operation 4.10 symmetrical patterns operation 4.11 Generation of surfaces from points obtained by 3DScann		
<b>Readings and other resources</b>	<p>library resources</p> <p>[1 ] David C. Planchard , " With SolidWorks 2014 Engineering graphics and video instruction : a step by step project based approach " SDC Publications.</p> <p>[2 ] David C. Planchard , "Certified SolidWorks Associate CSWA Exam Guide 2009 : an authorized CSWA exam preparation guide" SDC Publications</p> <p>[3] K.L. Narayana , P. Kannaiah , K, Venkata Reddy, "Machine drawing" , New Age International Publishers, 3rd.Ed.</p> <p>Electronic resources</p> <p>SolidWorks video tutorials : <a href="http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html">http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html</a></p>	
<b>Teaching methods</b>	The student must perform tasks that involve drawings of mechanical elements where they implement each of the topics reviewed in class. The student must develop a project in which the planes of manufacturing and assembly of a mechanical system are involved.	
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<b>5.- Part Modeling</b>	<b>6 hours</b>
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<b>Specific Objective:</b>	The student will know , handle and apply the CAD commands for drawing and editing 3D
	5.1 Main Operation angle desmolde 5.2 Symmetry in the Sketch 5.3 Drafted into the mold 5.4 View Options 5.5 Operation Sweep and revolution 5.6 outlined previously created on faces 5.7 Employment edges of modeling in the sketch 5.8 Generation geometries from a sketch cutting
<b>Readings and other resources</b>	library resources [1 ] David C. Planchard , " With SolidWorks 2014 Engineering graphics and video instruction : a step by step project based approach " SDC Publications. [2 ] David C. Planchard , "Certified SolidWorks Associate CSWA Exam Guide 2009 : an authorized CSWA exam preparation guide" SDC Publications [3] K.L. Narayana , P. Kannaiah , K, Venkata Reddy, "Machine drawing" , New Age International Publishers, 3rd.Ed. <u>Electronic resources</u> SolidWorks video tutorials : <a href="http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html">http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html</a>
<b>Teaching methods</b>	The student must perform tasks that involve drawings of mechanical elements where they implement each of the topics reviewed in class. The student must develop a project in which the planes of manufacturing and assembly of a mechanical system are involved.
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<b>6.- Special modeling parts</b>		<b>3 hours</b>
<b>Specific goal:</b>	The student will know , handle and apply the CAD commands for special 3D part modeling .	
	6.1 Main Operation angle desmolde 6.2 Symmetry in the Sketch 6.3 Drafted into the model 6.4 View Options 6.5 Operations revolution Drafted 6.6 on previously created faces 6.7 Employment edges modeled on the sketch 6.8 Generating geometries from a sketch cutting 6.9 Cascarones and reinforcements 6.10 Analysis and mold release angle 6.11 reinforcements 6.12 Operations wall	



<b>Readings and other resources</b>	<p>library resources</p> <p>[1 ] David C. Planchard , " With SolidWorks 2014 Engineering graphics and video instruction : a step by step project based approach " SDC Publications.</p> <p>[2 ] David C. Planchard , "Certified SolidWorks Associate CSWA Exam Guide 2009 : an authorized CSWA exam preparation guide" SDC Publications</p> <p>[3] K.L. Narayana , P. Kannaiah , K, Venkata Reddy, "Machine drawing" , New Age International Publishers, 3rd.Ed.</p> <p><u>Electronic resources</u></p> <p>SolidWorks video tutorials : <a href="http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html">http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html</a></p>
<b>Teaching methods</b>	The student must perform tasks that involve drawings of mechanical elements where they implement each of the topics reviewed in class. The student must develop a project in which the planes of manufacturing and assembly of a mechanical system are involved.
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<b>7.- Modelado de piezas de chapa metálica y piezas soldadas</b>		<b>3 hours</b>
<b>Specific goal:</b>	The student will know , handle and apply the CAD commands for modeling weldment and sheet metal operations .	
7.1 Modeling of sheet metal parts 7.2 Modeling weldments 7.2.1 General 7.2.2 Structural members 7.2.3 Welding seams		
<b>Readings and other resources</b>	<p>library resources</p> <p>[1 ] David C. Planchard , " With SolidWorks 2014 Engineering graphics and video instruction : a step by step project based approach " SDC Publications.</p> <p>[2 ] David C. Planchard , "Certified SolidWorks Associate CSWA Exam Guide 2009 : an authorized CSWA exam preparation guide" SDC Publications</p> <p>[3] K.L. Narayana , P. Kannaiah , K, Venkata Reddy, "Machine drawing" , New Age International Publishers, 3rd.Ed.</p> <p><u>Electronic resources</u></p> <p>SolidWorks video tutorials : <a href="http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html">http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html</a></p>	
<b>Teaching methods</b>	The student must perform tasks that involve drawings of mechanical elements where they implement each of the topics reviewed in class. The student must develop a project in which the planes of manufacturing and assembly of a mechanical system are involved.	
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<b>8.- Editing for repairs and design changes</b>		<b>3 hours</b>
<b>Specific goal:</b>	he student will know , handle and apply editing commands 3D models for future design changes .	
8.1 Part edition 8.2 Editing topics 8.3 Employment and DraftXpert FilletXpert 8.4 Tools reconstruction 8.5 Instant 3D Edition		



<b>Readings and other resources</b>	<p>library resources</p> <p>[1 ] David C. Planchard , " With SolidWorks 2014 Engineering graphics and video instruction : a step by step project based approach " SDC Publications.</p> <p>[2 ] David C. Planchard , "Certified SolidWorks Associate CSWA Exam Guide 2009 : an authorized CSWA exam preparation guide" SDC Publications</p> <p>[3] K.L. Narayana , P. Kannaiah , K, Venkata Reddy, "Machine drawing" , New Age International Publishers, 3rd.Ed.</p> <p><u>Electronic resources</u></p> <p>SolidWorks video tutorials : <a href="http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html">http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html</a></p>
<b>Teaching methods</b>	The student must perform tasks that involve drawings of mechanical elements where they implement each of the topics reviewed in class. The student must develop a project in which the planes of manufacturing and assembly of a mechanical system are involved.
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<b>9.- Configurations</b>		<b>3 hours</b>
<b>Specific goal:</b>	That students understand , use , create and configure the CAD software to reduce development time 3D models.	
9.1 Settings and use 9.2 Creating configurations 9.3 Linked values 9.4 Equations 9.5 Configuring dimensions and features 9.6 Strategies for modeling configurations 9.7 Editing parts figurations		
<b>Readings and other resources</b>	<p>library resources</p> <p>[1 ] David C. Planchard , " With SolidWorks 2014 Engineering graphics and video instruction : a step by step project based approach " SDC Publications.</p> <p>[2 ] David C. Planchard , "Certified SolidWorks Associate CSWA Exam Guide 2009 : an authorized CSWA exam preparation guide" SDC Publications</p> <p>[3] K.L. Narayana , P. Kannaiah , K, Venkata Reddy, "Machine drawing" , New Age International Publishers, 3rd.Ed.</p> <p><u>Electronic resources</u></p> <p>SolidWorks video tutorials : <a href="http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html">http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html</a></p>	
<b>Teaching methods</b>	The student must perform tasks that involve drawings of mechanical elements where they implement each of the topics reviewed in class. The student must develop a project in which the planes of manufacturing and assembly of a mechanical system are involved.	
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<b>10.- Generation of drawings</b>		<b>5 hours</b>
<b>Specific goal:</b>	The student will know , manage and generate the drawings according to the desired standard ( Formats , views , projections, etc. ) .	
10.1 Model and Views section 10.2 Detail Views 10.3 Drawing sheets and formats and editing 10.4 Projected Views		



<b>Readings and other resources</b>	<u>library resources</u> [1 ] David C. Planchard , " With SolidWorks 2014 Engineering graphics and video instruction : a step by step project based approach " SDC Publications. [2 ] David C. Planchard , "Certified SolidWorks Associate CSWA Exam Guide 2009 : an authorized CSWA exam preparation guide" SDC Publications [3] K.L. Narayana , P. Kannaiah , K, Venkata Reddy, "Machine drawing" , New Age International Publishers, 3rd.Ed. <u>Electronic resources</u> SolidWorks video tutorials : <a href="http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html">http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html</a>
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<b>11.- Up assemblies modeling</b>		<b>6 hours</b>
<b>Specific goal:</b>	That students know and apply models of assemblies and subassemblies .	
	11.1 Up Assembled 11.2 Creating an assembly 11.3 Positioning of the components 11.4 Operations Manager and its symbolism Adding 11.5 parts Configurations 11.6 parts in assemblies 11.7 Subassemblies 11.8 intelligent Relations 11.9 assemblies and subassemblies Bagging 11.10 Interference analysis 11.11 Verification of clearances and change in the value of dimensions 11.12 Explode assemblies 11.13 Lines explosion 11.14 List of materials 11.15 Drawings of assemblies	
<b>Readings and other resources</b>	<u>library resources</u> [1 ] David C. Planchard , " With SolidWorks 2014 Engineering graphics and video instruction : a step by step project based approach " SDC Publications. [2 ] David C. Planchard , "Certified SolidWorks Associate CSWA Exam Guide 2009 : an authorized CSWA exam preparation guide" SDC Publications [3] K.L. Narayana , P. Kannaiah , K, Venkata Reddy, "Machine drawing" , New Age International Publishers, 3rd.Ed. <u>Electronic resources</u> SolidWorks video tutorials : <a href="http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html">http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html</a>	
<b>Teaching methods</b>	The student must perform tasks that involve drawings of mechanical elements where they implement each of the topics reviewed in class. The student must develop a project in which the planes of manufacturing and assembly of a mechanical system are involved.	



<b>Learning activities</b>	Professor will design activities that allow the evaluation of StudentOutcomes involved in the course .
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<b>12.- Templates</b>		<b>2 hours</b>
<b>Specific goal:</b>	The student will know , configure and generate drawing templates .	
12.1 Configuring System 12.2 Document Template		
<b>Readings and other resources</b>	<u>library resources</u> [1 ] David C. Planchard , " With SolidWorks 2014 Engineering graphics and video instruction : a step by step project based approach " SDC Publications. [2 ] David C. Planchard , "Certified SolidWorks Associate CSWA Exam Guide 2009 : an authorized CSWA exam preparation guide" SDC Publications [3] K.L. Narayana , P. Kannaiah , K, Venkata Reddy, "Machine drawing" , New Age International Publishers, 3rd.Ed. <u>Electronic resources</u> SolidWorks video tutorials : <a href="http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html">http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html</a>	
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<b>Learning activities</b>	Professor will design activities that allow the evaluation of StudentOutcomes involved in the course .	

**E) TEACHING AND LEARNING METHODOLOGIES**

The student must perform tasks in which drawings are made of mechanical elements where they implement each of the topics reviewed in class. The student must develop a project in which the planes of manufacturing and assembly of a mechanical system are involved. Professor will design activities that allow the evaluation of Student Outcomes involved in the course ; for the achievement of learning outcomes for students

**F) EVALUATION CRITERIA:**

Evaluation:	Periodicity	Evaluation Method and Weighting Suggested	Topics covered
1st . Partial evaluation	session 16	<b>33 % Total evaluation</b> Partial Evaluation : 90%Exam, 10% (Tasks, investigations, exercises, considerations).	subjects: 1,2,3 y 4
2nd Partial Evaluation	session 32	<b>33 % Total evaluation</b> Partial Evaluation : 90%Exam, 10% (Tasks, investigations, exercises, considerations).	subjects: 5,6, 7 y 8
3rd . Partial evaluation	Session 48	<b>33 % Total evaluation</b> Partial Evaluation : 90%Exam, 10% (Tasks, investigations, exercises,	subjects: 9, 10 ,11 y 12





		considerations).	
Final Ordinary evaluation		Average 3 partial evaluations	
Other activity:		Class Project	
Extraordinary exam	Week 17 of the semester	100% Exam	100% agenda
According to exam	According to schedule school secretary	100% Exam	100% agenda
Regularization exam	According to schedule school secretary	100% Exam	100% agenda

#### G) BIBLIOGRAPHY AND ELECTRONIC RESOURCES

##### Basic texts

- [1] David C. Planchard, *“Engineering graphics with SolidWorks 2014 and video instruction: a step by step project based approach”*, SDC Publications.
- [2] David C. Planchard, *“Certified SolidWorks 2009 associate CSWA exam guide: an authorized CSWA preparation exam guide”*, SDC Publications
- [3] K.L. Narayana, P. Kanniah, K, Venkata Reddy, *“Machine drawing”*, New Age International Publishers, 3<sup>rd</sup>.Ed.

##### Internet sites

Video tutoriales de AutoCAD: <http://www.lynda.com/AutoCAD-training-tutorials/160-0.html>

Video tutoriales de AutoCAD: <http://www.lynda.com/AutoCAD-LT-tutorials/AutoCAD-2015-Essential-Training/162105-2.html>

Video tutoriales de AutoCAD: <http://www.lynda.com/AutoCAD-training-tutorials/160-0.html>

Video tutoriales de SolidWorks: <http://www.lynda.com/SolidWorks-tutorials/SolidWorks-2014-Essential-Training/143606-2.html>

Video tutoriales de SolidWorks: <http://www.lynda.com/SolidWorks-tutorials/Sheet-Metal-Design-SolidWorks/124390-2.html>