INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

AERONAUTICAL ENGINEERING

COURSE DESCRIPTOR

Course Title	**COMPUTER AIDED AIRCRAFT ENGINEERING DRAWING**				
Course Code	AAE106				
Programme	B.Tech				
Semester	V	AE			
Course Type	Core				
Regulation	IARE - R16				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	-	-	-	3	2
Chief Coordinator	Mr. R Sabari Vihar, Assistant Professor				
Course Faculty	Mr. R Sabari Vihar, Assistant Professor Ms. M Shravani, Assistant professor				

I. COURSE OVERVIEW:

Computer aided aircraft engineering drawing lab aims to equip students with knowledge of components of aircraft and also with a designing tool CATIA which is current trend in industry.This course helps students will learn five workbenches of CATIA, which are common for any three dimensional CAD designing tool.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	AME102	II	Computer aided engineering drawing	2

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Computer aided aircraft engineering drawing	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✘	Chalk & Talk	✘	Quiz	✘	Assignments	✘	MOOCs
✔	LCD / PPT	✘	Seminars	✘	Mini Project	✔	Videos
✘	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):
CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	**Laboratory**		**Total Marks**
Type of Assessment	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):
One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	**Performance**	**Calculations and Graph**	**Results and Error Analysis**	**Viva**	**Total**
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 3	**Design/development of solutions:**Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	3	Calculations of the observations
PO 5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations**.**	3	Lab practices

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	**Professional skills:** Able to utilize the knowledge of aeronautical/aerospace engineering in innovative, dynamic and challenging environment for design and development of new products	2	Lab Practices
PSO2	**Problem-solving Skills:** Imparted through simulation language skills and general purpose CAE packages to solve practical, design and analysis problems of components to complete the challenge of airworthiness for flight vehicles.	2	Lab Practices
PSO 3	**Practical implementation and testing skills:** Providing different types of in house and training and industry practice to fabricate and test and develop the products with more innovative technologies	--	--
PSO 4	**Successful career and entrepreneurship:** To prepare the students with broad aerospace knowledge to design and develop systems and subsystems of aeronautical/aerospace allied systems to become technocrats.	--	--

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Understand the concepts and various tools used in design module.
II	Understand the design of typical structural components.
III	Understand the design of typical aircraft components.
IV	Understand the design of three view diagram of a typical aircraft

IX. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AAE106.01	CLO 1	Undestand the interface of threedimensional computer aided drawing softwares.	PO5	3
AAE106.02	CLO 2	Gain knowledge about different workbenches in computer aided three dimensional interactive application (CATIA)	PO5	2
AAE106.03	CLO 3	Ability to model different components in CATIA.	PO3	2
AAE106.04	CLO 4	Understand difference between surface, sheet, plate and component.	PO3	2
AAE106.05	CLO 5	Remember different tools in different workbenches and to be able to use them efficiently.	PO3	3
AAE106.06	CLO 6	Ability to use tools in each workbench to design desired component in CATIA.	PO5	2
AAE106.07	CLO 7	Understand what are boolean operations and where they are used.	PO5	3
AAE106.08	CLO 8	Gain knowledge about different sheetmetal operations and hoe to execute them in sheetmetal design workbench.	PO3	2
AAE106.09	CLO 9	Understand different terminolgies used in sheeetmetal operations.	PO3	2
AAE106.10	CLO 10	Gain knowledge about different operations used in surface design workbench.	PO3	2
AAE106.11	CLO 11	Understand how to make complex shapes using different tools in surface design worbench.	PO5	3
AAE106.12	CLO 12	Gain knowledge about top down and bottom up assembly methods and where to use which method.	PO3	2
AAE106.13	CLO 13	Understand how different components are assembled based on sub assembly and main assembly types.	PO5	2
AAE106.14	CLO 14	Understand about different tolerances and how tolerances are given to components.	PO3	2
AAE106.15	CLO 15	Ability to read and understand different kinds of symbols used in manufacturing industry and how they are achieved.	PO3	3
AAE106.16	CLO 16	Ability to design different aircraft components using different tools in three dimensional CAD softwares.	PO5	3

3 = High; 2 = Medium; 1 = Low

X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO 1					3								2			
CLO 2					2									2		
CLO 3			2										2			
CLO 4			2											2		
CLO 5			3										2			
CLO 6					2								2			
CLO 7					3									2		
CLO 8			2											2		
CLO 9			2											2		
CLO 10			2										2			
CLO 11					3								3			
CLO 12			2											2		
CLO 13					2									2		
CLO 14			2											2		
CLO 15			3											2		
CLO 16					3								3			

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 3, PO 5, PSO 1, POS 2	SEE Exams	PO 3, PO 5, PSO 1, POS 2	Assignments	-	Seminars	-
Laboratory Practices	PO 3, PO 5, PSO 1, POS 2	Student Viva	-	Mini Project	-	Certification	-

XII. ASSESSMENT METHODOLOGIES - INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

LIST OF EXPERIMENTS	
Week-1	**SKETCHER**
Interface, Sketch Tools, View Tool bar, Profile Tool bar, Operation Tool bar, Tools , Constrain tool bar, Transformation Tool bar, User Selection Filter, Standards, Visualizations.	
Week-2	**PART DESIGN**
Sketch Based Features, Dress up Features, Transformation Features, Reference Elements, Measure, Thickness, Boolean Operations.	
Week-3	**SHEET METAL DESIGN**
Walls, Cutting and Stamping, Bending, Rolled Walls,	
Week-4	**SURFACE DESIGN**
Surfacer, Operations, Wireframe, Replication.	
Week-5	**ASSEMBLY**
Product Structure Tools, Constrains.	
Week-6	**GD&T**
Introduction to Geometric Dimensioning and Tolerance, Weld Symbols, GD&T Symbols, Types of Tolerances, Types of views, Roughness Symbols.	
Week-7	**DRAFTING**
Views, Annotations, Sheet Background.	
Week-8	**DESIGN OF AIRCRAFT WING**
Design of any two types of Aircraft structures	
Week-9	**DESIGN OF FUSELAGE**
Design of fuselage with internal components	
Week-10	**DESIGN OF NOSE CONE**
Design of Nose cone structures	
WeeK-11	**DESIGN OF LANDING GEAR**
Design of Main landing gear and nose landing gear	
Week-12	**REVISION**
Revision	
Reference Books: 1. http://www.ehu.eus/asignaturasKO/DibujoInd/Manuales/R12_manual_catia_v5.pdf 2. http://www.engr.psu.edu/xinli/edsgn497k/TeaPotAssignment.pdf 3. http://file1.engineering.com/pdf/PartDesign.pdf 4. https://www.3ds.com/fileadmin/general/Terms/Licensed-Program Specifications /CATIA /CATIA_ V5R18.pdf	

XIV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week No.	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Introduction about CATIA and different workbenches in it.	CLO 1, CLO 2, CLO3, CLO4	R3: 172
2	Interface, Sketch Tools, View Tool bar, Profile Tool bar, Operation Tool bar, Tools , Constrain tool bar, Transformation Tool bar, User Selection Filter, Standards, Visualizations.	CLO 5	R3: 173
3	Sketch Based Features, Dress up Features, Transformation Features, Reference Elements, Measure, Thickness, Boolean Operations.	CLO 6, CLO 7	R3: 174
4	Walls, Cutting and Stamping, Bending, Rolled Walls	CLO 8, CLO 9	R3: 178
5	Surfacer, Operations, Wireframe, Replication.	CLO 10, CLO 11	R3: 179
6	Product Structure Tools, Constrains.	CLO 12, CLO 13	R3: 181
7	Introduction to Geometric Dimensioning and Tolerance, Weld Symbols, GD&T Symbols, Types of Tolerances, Types of views, Roughness Symbols.	CLO 14, CLO 15	R3: 184
8	Views, Annotations, Sheet Background.	CLO 14, CLO 15	R3: 185
9	Design of any two types of Aircraft structures	CLO 16	R3: 186
10	Design of fuselage with internal components	CLO 16	R3: 187
11	Design of Nose cone structures	CLO 16	R3: 195
12	Design of Main landing gear and nose landing gear	CLO 16	R3: 198

XV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S No	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	To organize certifiation programs that will help students to stay ahead in competative world.	Certifications	PO 5	PSO 1

Prepared by:

Mr. R Sabari Vihar, Assistant Professor

HOD, AE