INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

Department of Aeronautical Engineering

Attainment of Program Outcomes (POs) and Program Specific Outcomes (PSOs) of 2016 - 2020 batch (IARE - R16)

Subject Code	Course title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
AHS001	English for communication										1.50					
AHS002	Linear algebra and ordinary differential equations	1.80	1.70													
AHS005	Engineering chemistry	2.10	1.40					2.30								
AHS007	Applied physics	1.70	1.90		1.30											2.40
AME001	Engineering drawing	2.30	2.30			2.30				2.30	2.30				2.30	
AHS101	Communication skills laboratory									3.00	3.00					
AHS103	Engineering chemistry laboratory	3.00	3.00					3.00								
ACS113	IT workshop	2.40	2.40			2.40							2.40			2.40
AME101	Basic workshop	2.10		2.10			2.10			2.10	2.10				2.10	
AME002	Engineering mechanics	0.80	0.80	0.80											0.80	
AHS003	Computational mathematics and integral calculus	1.80	1.70													
AHS008	Modern physics	2.80	2.80		2.90											2.90
AHS009	Environmental studies	2.00			2.40			2.00								
ACS001	Computer programming	1.10	1.10	1.10		1.10					1.10		1.10			1.10
AHS102	Computational mathematics laboratory	3.00	3.00		3.00									3.00		

AHS105	Engineering physics laboratory	3.00	3.00		3.00											3.00
ACS101	Computer programming laboratory	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00		2.00		2.00			2.00
AME102	Computer aided engineering drawing practice					0.90					0.90		0.90			0.90
AHS011	Mathematical transform techniques	1.40	1.10		1.30									1.10		
AAE001	Introduction to Aerospace Engineering	1.50	1.20	1.00											1.20	
AAE002	Theory of Structures	1.10	1.20												1.00	
AAE003	Fluid Mechanics and Hydraulics	2.40	2.50	1.90	1.90								2.10	2.40	2.20	
AEE018	Basic Electrical and Electronics Engineering	2.50	2.70											2.40		
AAE101	Mechanics of Solids Laboratory	3.00	3.00				3.00			3.00	3.00				3.00	
AAE102	Fluid Mechanics and Hydraulics Laboratory	3.00	3.00		3.00		3.00			3.00	3.00					3.00
AEE103	Basic Electrical and Electronics Engineering Laboratory	1.60	1.60						1.60	1.60	1.60		1.60	1.60		
AHS004	Complex Analysis and Probability Distribution	1.30	1.10		1.50											
AME003	Thermodynamics	2.20	2.30	2.20												2.30
AAE004	Low speed aerodynamics	2.00	2.00	1.80	2.20	1.80							2.20	2.00		
AAE005	Aircraft Materials and Production	1.90						1.90					1.60		2.00	
AAE006	Analysis of Aircraft Structures	1.80	1.70	1.60	2.30	2.90							2.80		2.00	2.30
AAE103	Aerodynamics laboratory	2.70	2.70	2.70			2.70			2.70	2.70			2.70		
AAE104	Aerospace structures laboratory	2.70	2.70	2.70			2.70			2.70	2.70				2.70	
AAE105	Aircraft Materials and Production Laboratory	3.00					3.00	3.00		3.00	3.00				3.00	
AAE007	Aircraft propulsion	2.50	2.50	1.80	2.80									2.70	2.70	
AAE008	High speed aerodynamics	1.00	1.00	1.00	0.90	0.90					1.20		1.10	1.00		1.10
AAE009	Finite element methods	1.40	1.40	1.10	1.20	1.20					1.10		1.20		1.70	1.10
AAE010	Aircraft systems and controls	1.60	1.30												1.80	

AAE011	Aircraft performance	0.90	1.00	1.00											0.80	1.10
AAE106	Computer aided aircraft engineering drawing	0.70	0.70			0.70				0.70	0.70		0.70			0.70
AAE107	Flight controls laboratory	2.40	2.40	2.40		2.40				2.40	2.40		2.40		2.40	
AHS106	Research and content development	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
AAE515	Heat transfer	1.20	1.20													1.20
AAE523	Mechanism and machine design	1.70	1.70	1.80											1.20	1.80
AME552	Introduction to Automobile Engineering	1.70	1.70	1.80			1.80	1.80								1.70
AME553	Introduction to Robotics	2.60	2.60	2.30	1.70											2.60
AAE012	Space propulsion	1.60	1.60	1.60												1.60
AAE013	Computational aerodynamics	1.10	1.10	1.10	1.10	1.20	0.90	1.10			1.10		1.20	1.10		1.20
AAE014	Aircraft stability and control	1.10	1.10	1.10											1.10	1.20
AAE509	Experimental aerodynamics	2.90	2.90	2.90										2.90		
AAE526	Air transportation system	1.60	1.60									1.50			1.50	1.80
AAE108	Aerospace propulsion laboratory	3.00	3.00	3.00			3.00			3.00	3.00					3.00
AAE109	Computational aerodynamics laboratory	3.00	3.00	3.00	3.00	3.00				3.00	3.00		3.00			3.00
AAE110	Computer aided manufacturing laboratory	3.00	3.00	3.00			3.00	3.00		3.00	3.00		3.00			3.00
AAE201	Ideation and product development	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
AAE019	Aviation management	2.90	2.90												2.90	
AEE551	Energy from waste	1.20		1.20			1.30	1.30					1.30			
AAE015	Aerospace structural dynamics	1.30	1.30	1.20	1.40		1.20		1.20		1.20		1.20	1.40	1.20	1.20
AAE016	Space mechanics	1.20	1.00												1.10	
AAE017	Flight vehicle design	1.30	1.20	1.20			1.20	1.40	1.20	1.20	1.20		1.20	1.20	1.40	1.20
AAE506	Unmanned air vehicles	2.30	2.20		2.30		2.80							2.30	2.60	

AAE530	Airport operations	1.50					1.50	1.50	1.50			1.50				1.50
AHS552	Research methodologies	2.20	2.20	2.20	2.20	2.20			2.20				2.20			2.20
AAE111	Computational structural analysis laboratory	3.00	3.00	3.00	3.00	3.00				3.00	3.00		3.00			3.00
AAE112	Flight vehicle design laboratory	2.30	2.30	2.30	2.30	2.30				2.30	2.30		2.30		2.30	2.30
AAE113	Aerospace structural dynamics laboratory	3.00	3.00	3.00			3.00			3.00	3.00				3.00	
AAE018	Flights controls theory	2.90	2.90	2.90	2.90	2.90	2.90				2.90		2.90	2.90	2.90	2.90
AAE518	Rocket and missiles	1.60	1.90											1.80	2.40	
AAE525	Avionics and instrumentation	2.90		2.90			2.90								2.90	2.90
AAE401	Comprehensive examination	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00		3.00	3.00	3.00	3.00	3.00
AAE302	Project work	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Direct attainment value		2.1	2.1	2.1	2.3	2.1	2.4	2.3	2.1	2.6	2.2	2.5	2	2.2	2.1	2.1

Overall Attainment

S No.	Assessment Component(Direct + Indirect)	Program Outcomes												PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1.	Direct Assessment (CIA + SEE + Course End Survey) (a)	2.1	2.1	2.1	2.3	2.1	2.4	2.3	2.1	2.6	2.2	2.5	2	2.2	2.1	2.1
2.	Student Program exit surveys (b)	2.4	2.5	2.1	2.0	2.5	2.6	2.5	2.6	2.5	2.5	2.4	2.4	2.5	2.4	2.5
3.	Employer surveys (c)	2.4	2.4	2.4	2.1	2.4	2.1	1.9	1.9	1.9	2.6	1.9	2.5	2.5	2.4	2.5
4.	Alumni Survey (d)	2.6	2.8	2.5	2.4	2.4	2.7	2.6	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Overall attainment = a*0.8 + b*0.1 + c*0.05 + d*0.05		2.2	2.2	2.1	2.3	2.2	2.4	2.3	2.2	2.5	2.3	2.5	2.1	2.3	2.2	2.2

Action taken to improve the attainment of POs and PSOs:

POs	Target Level	Attainment Level	Observations
PO 1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
PO 1	**1.9**	**2.2**	Target Achieved. Following courses were identified which didn't meet the attainment target AAE001, AAE002, AAE006, AHS004, AAE008, AAE009, AAE010, AAE011, AAE011, AAE012, AAE014, AAE015, AAE016, AAE530, AAE017, AAE518, AAE523.
Action: 1. Additional theory classes and tutorials to be conducted for students to gain a better understanding of the concepts of science and engineering. 2. Guest lectures and expert talk to be conducted to enrich the industry-oriented engineering knowledge.			
PO 2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.			
PO 2	**1.5**	**2.2**	Target Achieved. Following courses were identified which didn't meet the attainment target AME002, AAE001, AAE106, AAE002, AAE008, AAE009, AAE010, AAE011, AAE013, AAE014, AAE014, AAE015, AAE016, AAE017, AAE515.
Action: 1. More emphasize on tutorial classes for problem solving. 2. Research journal access in the library is available for students to read journal articles on the latest research. 3. Students are encouraged to participate in science project exhibition for developing an analytical mind which can work towards problem solving.			
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.			
PO 3	**1.5**	**2.1**	Target Achieved. Following courses were identified which didn't meet the attainment target AME002, AAE001, AAE008, AAE009, AAE011, AAE013, AAE014, AAE015, AAE017.

Action:

1. The Careers and Employability Skills Training (CEST) is working on Industry-Institute Interaction and preparing manpower of world class in the field of science and technology by inculcating various skills required by the industry.
2. Multiple workshops will be conducted on design and development of UAVs for multidisciplinary applications
3. Students are motivated to participate in design contests organized by national and international agencies.
4. The Skill Bridge Program has created a platform for students to horn their Employability skills along with Aptitude through various activities. Skills covered under this program are

- Aircraft structure design (software used CATIA)
- Structural Analysis (software used ANSYS)
- Mechanism Design (CATIA DMU)
- Computational Fluid Analysis (CFD) (software used ANSYS FLUENT)

PO 4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 4	**1.6**	**2.3**	Target Achieved. Following courses were identified which didn't meet the attainment target AAE008, AAE009, AAE013, AAE015.

Action:

1. Expert talk and Academic workshops will be conducted to improve the knowledge on experiments and analysis of results.
2. Research based Courses will be included, syllabi to be updated to include and inculcate the analysis, research skills.

PO5: Modern Tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 5	**1.8**	**2.2**	Target Achieved. Following courses were identified which didn't meet the attainment target AME102, AAE008, AAE009, AAE106, AAE013.

Action:

1. Modern labs will be developed to learn/ demonstrate the use of Modern software tools like MATLAB (for analysis); Auto CAD (for basic modeling); ABAQUS (for FEM), Aircraft structure design (software used CATIA), Mechanism Design (CATIA DMU), Computational Fluid Analysis (CFD) (software used ANSYS FLUENT.
2. Students will be taught with modern modes and methods of teaching like using LCD Projectors and with interactive and digital boards and learning in smart class rooms equipped with real time lecture webcast/broadcast facilities.

PO 6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 6	**1.4**	**2.4**	Target Achieved. Following courses were identified which didn't meet the attainment target AAE013, AAE015, AAE017.

Action:

1. Student industry visits will be arranged to understand the safety concern, social aspects and expand their practical knowledge.
2. Students will be encouraged to participate in Swach Bharat drives, Blood Donation Camps, village visits, and teaching and mentoring of downtrodden children.

PO 7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 7	**1.5**	**2.3**	Target Achieved. Following courses were identified which didn't meet the attainment target AAE013, AAE017, AAE530.

Action:

1. Students are encouraged to engage in projects relating to energy consumption and the use of renewable energy resources that address global and environmental issues.
2. The activity like Tree Plantation (Haritha Haram) are being organized to encourage the students for understanding the responsibility towards environment.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 8	**1.5**	**2.2**	Target Achieved. Following courses were identified which didn't meet the attainment target AAE015, AAE017, AAE530.

Action:

1. Guest lecture were arranged to motive the students and made aware about the demands of engineering profession, duties towards society & fellow human beings and importance of honesty and ethics.
2. Students are encouraged to engage in Co-Curricular activities, Games, promote commitment to ethical principles.

PO 9 : Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 9	**1.8**	**2.5**	Target Achieved. Following courses were identified which didn't meet the attainment target AAE106, AAE017.

Action:

1. Institute has initiated Program which provides a platform to work in individual as well as a group in the fields of Engineering. It helps the students to groom the skills like leadership or as an effective team member. There are a number of societies and clubs where the students learn to work both as individuals and in a team work environment.
2. The laboratory work of the students is conducted by framing student groups so that students learn to work in a team environment.
3. The final year project work is conducted by first making student groups in which students with different abilities are included (decided on the basis of CGPA). These groups are allotted to faculty members as per the area-preference given by the students. This helps students to learn to work with team members of different capabilities and background.

PO 10: **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.			
PO 10	**1.6**	**2.3**	Target Achieved. Following courses were identified which didn't meet the attainment target AHS001, AME102, AAE106, AAE008, AAE009AAE013, AAE015, AAE017.
Action: 1. Soft skill training is imparted to students to develop various expressions of communication or technical talks by group discussion, presentation and new learning outcomes. 2. Alternate Assessment Tools like Tech talk and concept video presentations help them to overcome stage fear and come out with presentations			
PO 11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.			
PO 11	**1.4**	**2.5**	Target Achieved.
Action: 1. Project Expo and METE Expo are conducted for students from the first year itself along with their seniors to understand the concept of product development as well finance management for completion of such small projects. 2. Students are encouraged to take up full semester internship program in various organizations to take up industry-oriented project works.			
PO 12:Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change**.**			
PO 12	**1.4**	**2.1**	Target Achieved. Following courses were identified which didn't meet the attainment target AME102, AAE008**,** AAE009**,** AAE106, AAE013, AAE015, AAE017.
Action: 1. Students are made to recognize the importance of lifelong learning through pep/ motivational talks. Using ICT facilities, such as PPTs, live demonstration of topics imparted using video lecture and real time webcast and lecture contents including new technological developmental tools and knowledge of new products, gives students and lifelong knowledge to be further improved upon.			
PSO 1: Build embedded software and digital circuit development platform for robotics, embedded systems and signal processing applications.			
PSO 1	**1.6**	**2.3**	Target Achieved. Following courses were identified which didn't meet the attainment target AAE008, AAE013, AAE015, AAE017.

Action:

1. Multiple workshops will be conducted on design and development of UAVs for multidisciplinary applications.
2. Project works are encouraged that involve the usage of technical resources such as software's and existing experimental facilities for solving technical problems.

PSO 2: Focus on the application specific integrated circuit prototype designs, virtual instrumentation and system on chip designs.

PSO 2	**1.4**	**2.2**	Target Achieved. Following courses were identified which didn't meet the attainment target AME002, AAE001, AAE002, AAE011, AAE523, AAE014, AAE015, AAE016.

Action :

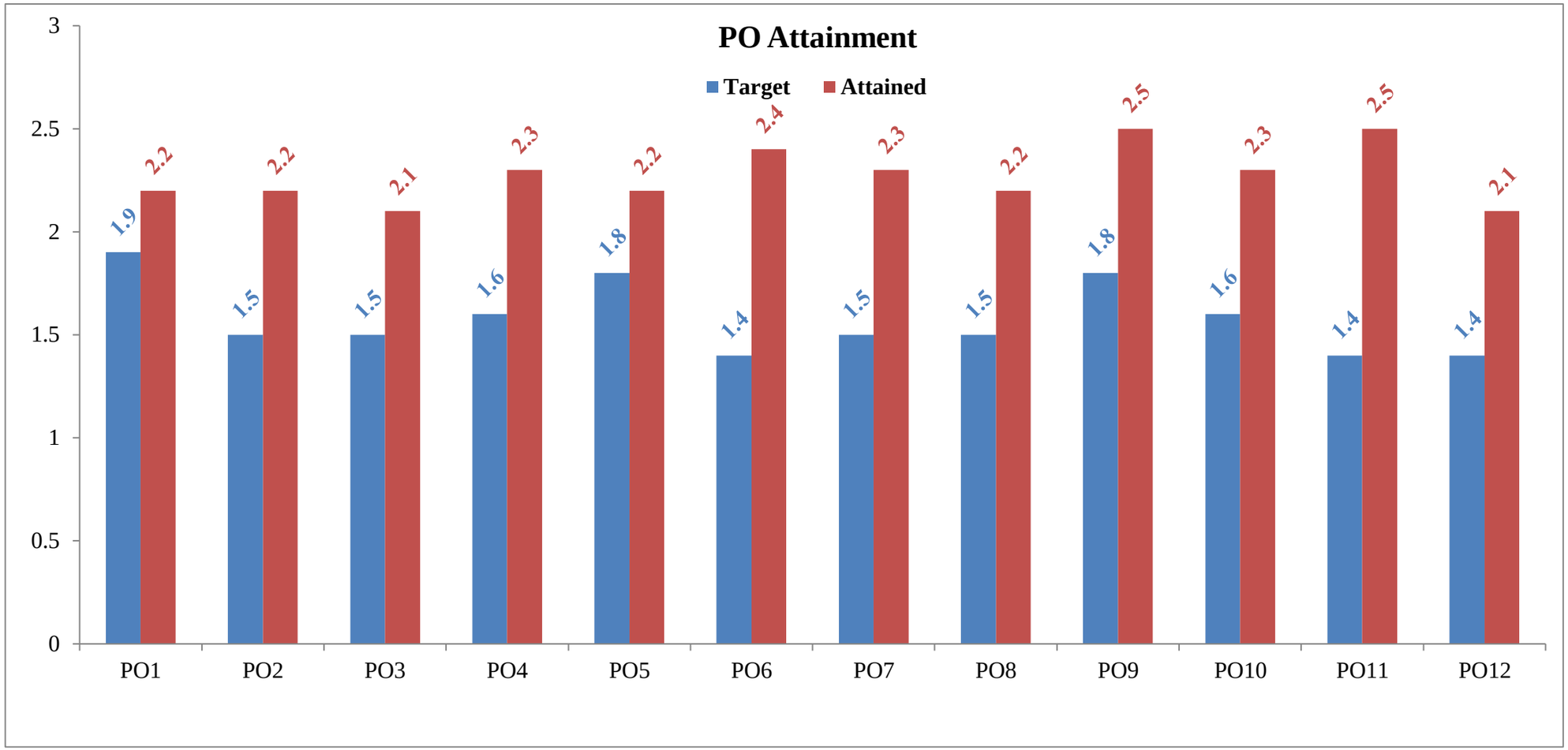
1. Students are motivated to take up the real-life problems during their project work so that they can design, analyze and find solution which gives exposure to latest technologies.

PSO 3: Make use of high frequency structure simulator for modeling and evaluating the patch and smart antennas for wired and wireless communication applications.

PSO 3	**1.5**	**2.2**	Target Achieved. Following courses were identified which didn't meet the attainment target AME102, AAE008, AAE011, AAE515, AAE013, AAE014, AAE015, AAE017.

Action:

1. Career readiness program and corporate lectures are arranged to meet required expertise in field of engineering.
2. Students are encouraged to take up certified courses on computational tools from various digital platforms.
3. Project works are encouraged that involve the usage of computational tools.


PO Attainment
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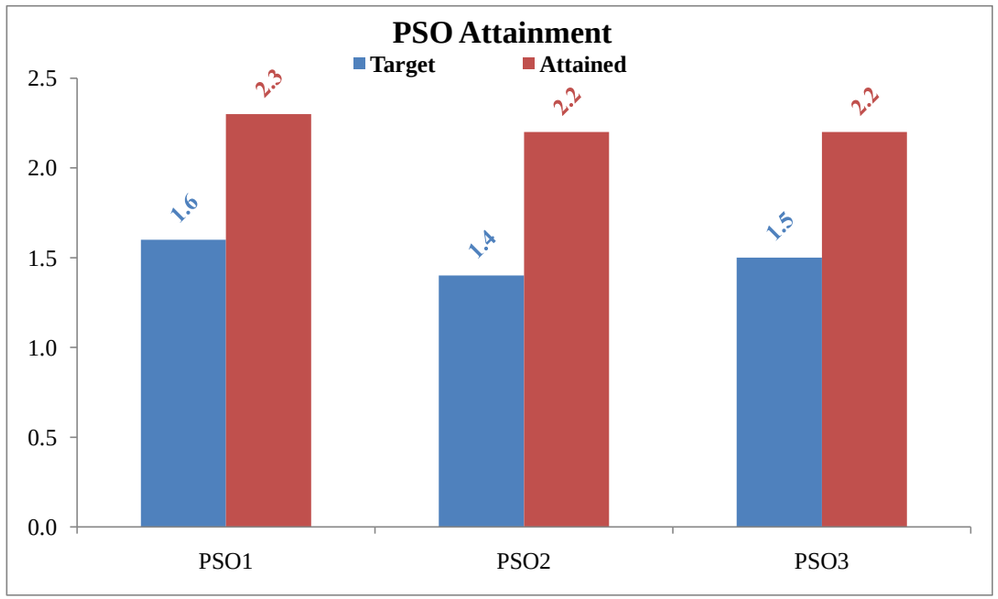
PSO Attainment
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PSO1
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