INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Attainment of Program Outcomes (POs) and Program Specific Outcomes (PSOs) of 2017 - 2021 batch (IARE - R16)

Course Code	Course	Program Outcomes(POs)												Program Specific Outcomes (PSOs)		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
AHS002	Linear Algebra And Ordinary Differential Equations	2.3	2.4											2.3		
AHS003	Computational Mathematics And Integral Calculus	2.8	2.9													
AHS005	Engineering Chemistry	2.3	2.6				2.3	2.3								
AHS006	Engineering Physics	3	2.9		2.9									3		
ACS001	Computer Programming	1.5	1.4	1.4		1.5					1.5		1.5	1.5		1.2
ACS101	Computer Programming Laboratory	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6		1.6		1.6	1.6	1.6	1.6
AME103	Computer Aided Engineering Drawing	2.3		2.3		2.3				2.3	2.3		2.3			2.3
AHS104	Engineering Physics And Chemistry Laboratory	3	3		3		3	3	3		3					3
AHS102	Computational Mathematics Laboratory	2.4	2.4		2.4									2.4		
AHS001	English For Communication										2.7					
AHS010	Probability And Statistics	2.4	2.6		2.4											
AHS009	Environmental Studies	2.7			2.4		2.7	2.7			2.7		2.7			2.7
ACS002	Data Structures	2.2	2.2	2.1	2.2	2.4					2.2		2.4	2.2	2.4	2.2
AEE001	Fundamental of Electrical and Electronics Engineering	2.1	2.5											1.8		
AHS101	Communication Skills Laboratory									2	2					

ACS102	Data Structures Laboratory	2.3	2.3	2.3	2.3	2.3	2.3		2.3	2.3	2.3		2.3	2.3	2.3	2.3
AEE101	Electrical and Electronics Engineering Laboratory	2.7	2.7			2.7			2.7	2.7	2.7		2.7	2.7		
ACS112	Engineering Practice Laboratory	2.4	2.4	2.4	2.4	2.4	2.4				2.4			2.4		2.4
ACS003	Object Oriented Programming Through Java	1.7	1.8	1.8	1.8						1.6		1.8	1.9	1.6	1.7
ACS004	Computer Organization and Architecture	2.6	2.5	2.5	2.3						2.5		2.5	2.6		2.7
AIT001	Design And Analysis of Algorithms	1.5	1.6	2.1	1.8								1.9	1.2		
AHS013	Discrete Mathematical Structures	1.9	1.7	2.1										1.9		
AEC020	Digital Logic Design	1.8	1.8	1.8	1.7						1.8				1.7	
AIT101	Design and Analysis Of Algorithms Laboratory		2.7	2.7	2.7	2.7	2.7	2.7	2.7		2.7		2.7	2.7	2.7	2.7
ACS103	Object Oriented Programming Through Java Laboratory	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3		2.3		2.3	2.3	2.3	2.3
AEC116	Digital Logic Design Laboratory	2.3	2.3	2.3		2.3				2.3	2.3				2.3	
ACS005	Database Management Systems	1.8	1.9	2	2.2	2.1					2		2.5	2	2.1	2
ACS006	Web Technologies	2	1.8	1.9	1.5	2					2		2	2	1.6	1.9
ACS007	Operating Systems	1.8	1.8	1.9	2						1.9		1.7	1.9	1.9	1.7
AIT002	Theory of Computation	2.4	2.5	2.6	2.3									2.3		2.3
AIT003	Computer Networks	1.6	1.4	1.5	1.3						1.4		1.2	1.3		1.4
ACS104	Database Management Systems Laboratory	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
ACS105	Web Technologies Laboratory	2.7	2.7	2.7		2.7	2.7	2.7	2.7	2.7	2.7		2.7	2.7	2.7	2.7
ACS106	Operating Systems Laboratory	2.3	2.3	2.3	2.3		2.3	2.3	2.3	2.3	2.3		2.3	2.3	2.3	2.3
ACS008	Software Engineering	2.3	2.2	2.5	2.3	2.3					2.1		2	2.4	2	2.2
AEC021	Microprocessors And Interfacing	1.8	1.8	1.8							1.9			1.5		
AIT004	Compiler Design	2	1.8	2.4		2.2					1.2			2.4	1.8	1.2
AHS012	Optimization Techniques	2.2	2.2	2.2	2						2.2		2.2	2.2		2.2
AHS015	Business Economics And Financial Analysis	2.5	2.3						2.3	2.4		2.2				2.2

ACS107	Software Engineering Laboratory	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7		2.7	2.7	2.7	2.7
AEC115	Microprocessors And Interfacing Laboratory	1.6	1.6	1.6		1.6							1.6			1.6
AHS106	Research And Content Development	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3		2.3	2.3	2.3	2.3
ACS511	Image Processing	1.9	1.9	1.4	1.7						1.9		1.9	2		
ACE551	Disaster Management	1.3					1.7	1.7		1.2						
ACS013	Information Security	1.9	2	2	2.4		2		2		2		2	2	2	2
ACS510	Internet Of Things (IoT)	2.1	1.9	1.8	1.9	1.7		1.7						1.8		2
ACS108	Object Oriented Analysis and Design Laboratory	2.4	2.4	2.4		2.4	2.4	2.4	2.4	2.4	2.4		2.4	2.4	2.4	2.4
ACS109	Linux Programming Laboratory	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3		2.3	2.3	2.3	2.3
AIT102	Data Warehousing and Data Mining Laboratory	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7		1.7	1.7	1.7	1.7
ACS201	Ideation and Product Development	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
ACS014	Machine Learning	1.5	1.5	1.4							1.5			1.5		1.5
AIT508	Software Development Methodology	1.6	1.6	1.7	1.5	1.6					1.6		1.5	1.7	1.2	1.7
ACS015	Object Oriented Analysis and Design Patterns	1.7	1.9	1.8		2					1.8		1.8		1.8	1.8
ACS010	Linux Programming	2.9			2.9	2.9					2.9		2.9	2.9	2.9	2.9
AIT006	Data Warehousing and Data Mining	2.1	1.9	1.8	1.9	1.9					1.9		2.1	1.9	1.8	2.1
AEE551	Energy from Waste	2.1		2.3			2.4	2.3					2.1		2.1	
ACS011	Cloud Application Development	2.4	2.5	2.3		1.2					2.4		2.4	2.1	2.2	2.5
AIT008	Software Testing Methodology	2.1	2	1.7	1.2	1.2								1.5	1.2	1.2
ACS012	Big Data and Business Analytics	1.4	1.5	1.4		1.4					1.4		1.4	1.4	1.4	1.5
ACS110	Cloud Application Development Laboratory	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3		2.3	2.3	2.3	2.3
AIT104	Software Testing Methodology Laboratory	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3		2.3			
ACS111	Big Data And Business Analytics Laboratory	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4		2.4	2.4	2.4	2.4
AIT514	E-Commerce	1.8	2.1	1.6	1.5						1.8			1.5	2.4	

ACS401	Comprehensive Examination	2	2	2	2	2	2	2				2	2	2	2	2
ACS302	Project Work	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Average Attainment		**2.1**	**2.2**	**2.1**	**2.1**	**2.1**	**2.3**	**2.3**	**2.3**	**2.3**	**2.1**	**2.2**	**2.2**	**2.1**	**2.1**	**2.1**

PO / PSO Attainment Overall

S. No	Assessment Components (Direct + Indirect)	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	2.2	2.1	2.1	2.1	2.3	2.3	2.3	2.3	2.1	2.2	2.2	2.1	2.1	2.1
2	Program Exit Survey (b)	2.4	2.4	2.3	2.3	2.5	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.5	2.5	2.5
3	Alumni Survey (c)	2.6	2.5	2.5	2.4	2.5	2.6	2.3	2.2	2.2	2.6	2.4	2.5	2.6	2.5	2.5
4	Employer 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
Final attainment = a*0.8 + b*0.1 + c*0.05 + d*0.05		**2.2**	**2.3**	**2.2**	**2.2**	**2.2**	**2.3**	**2.3**	**2.3**	**2.3**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**

POs & PSOs Attainment Levels and Actions for improvement:

Sustained efforts are made to ensure continuous attainment by monitoring the resources and processes. The following actions were taken to enhance the target level. The attainment of POs / PSOs and action taken for improvements in attainments for 2019-2020 is illustrated in table

POs/ PSOs	Target Level	Attainment Level	Observations
PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
PO1	**1.8**	**2.2**	Overall attainment of PO1 Target is Achieved. Computer Science and Engineering curriculum has a strong foundation of practical and theoretical knowledge of science, mathematics and own engineering principles. However, students need to know in correlating the theoretical concepts with practical applications.
Action 1: To improve knowledge levels of the students by explaining the basic engineering concepts with relevant engineering applications, motivation has been given to students through mentoring/counseling process, in which the mentor will identify the problems of students and help them to overcome the problems in concerned subjects. (Engineering chemistry, Computer programming, OOPS through Java, Design and analysis of algorithms, Data Base Management Systems, Machine learning, Linux programming, Bigdata and business Analytics) **Action 2:** Fundamentals are clearly explained with real-time applications and make the students practice a greater number of problems in programming language subjects and database applications with BuildIT platform. **Action 3:** Critical thinking exercises incorporated to understand the complex engineering problems easier. **Action 4:** Tutorial classes are conducted for improving the students' performance.			
PO2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.			
PO2	**1.5**	**2.2**	Overall attainment of PO2 reached to the target level. It is observed that Engineering Chemistry, Computer networks, Computer programming lab courses are moderately attained target level. Need to improve the analytical skills in view of problem identification, model translation and interpretation of results.
Action 1: New pedagogical initiatives such as open coding platforms are taken to improve the analytical skills of the students in problem solving with relevant engineering applications. **Action 2:** Students are encouraged to take part in implementation of real-time applications through hackathons, project based learning and case study.			
PO3: 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.			
PO3	**1.7**	**2.2**	Overall attainment of PO3 reached to the target level in most of the core courses. It is observed that, few of the courses; Computer Programming, Computer Networks, Disaster Management, Machine learning, Big Data and Business Analytics, and E-commerce are nearer to target level. The focus on design / development of solution for complex engineering problems are need to be improve in laboratory courses.
Action 1: Students are motivated to solve the real-time case studies through designing approaches in related courses of the curriculum for further improvement.			

POs/ PSOs	Target Level	Attainment Level	Observations
Action 2: Students' knowledge has been improved in applying engineering concepts to design solutions by conducting extra laboratory sessions. **Action 3:** Design related problems are incorporated in laboratory courses for improving the student skills in the development of projects.			
PO4: 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.			
PO4	**1.5**	**2.1**	Overall attainment of PO4 reached to the target level in most of the core courses. It is observed that, few courses Computer Networks, Linux Programming, Software Testing Methodologies are attained nearer to target. The focus on usage of research based methods in solution for complex engineering problems with innovations are needed.
Action 1: Critical thinking problems/ query exercises are incorporated in all the core courses. **Action 2:** Students are encouraged to participate in coding challenges, Hackathons and various online coding contests. **Action 3:** Students are motivated to participate actively in research based learning, ideation and product development courses to nurture their ideas along with complex problem solving 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.			
PO5	**1.9**	**2.2**	Overall attainment of PO5 reached to the target level in all the courses. It is observed that, the courses; Computer Programming, laboratory courses, Software Development Methodology, Software Testing Methodologies, Linux Programming, Cloud Application Development, Big Data and Business Analytics are attained nearer to target level. Students are encouraged to learn, practice and make use of appropriate modern tools through trainings, workshops and internships.
Action 1: Students are instructed to learn and use the open source and modern tools in implementation of projects and participation in hackathons. **Action 2:** Faculty are encouraged to identify course specific modern tools and encouraged to use in their regular course work.			
PO6: 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.			
PO6	**1.6**	**2.3**	Overall attainment of PO6 reached to the target level in all the relevant courses.
Action 1: Students are encouraged to develop applications in the corresponding laboratory courses and projects for the societal benefit. **Action 2**: Students are motivated to understand the safety concerns and social aspects to expand their practical knowledge.			
PO7: 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.			
PO7	**1.6**	**2.2**	Overall attainment of PO7 achieved target level in relevant courses. It is observed that Engineering Chemistry, Engineering Practice laboratory are attained nearer to target level.
Action 1: Awareness camps are conducted on global and environmental issues among the students.			

POs/ PSOs	Target Level	Attainment Level	Observations
Action 2: Students are encouraged to develop projects, in which global and environmental issues are addressed.			
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
PO8	**1.4**	**2.3**	Overall attainment of PO8 reached to target level. The students are lagging in real-life situations due to a lack of awareness on ethical principles and norms of the engineering practice.
Action 1: Students are encouraged to participate in professional ethics and security relevant courses and workshops. **Action 2:** Faculty inculcate the ethical values, principles, and professional responsibilities among students, wherever possible in their Teaching and learning practices.			
PO9 : Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			
PO9	**1.4**	**2.3**	Overall attainment of PO9 reached the target level. Consistent efforts are needed to inculcate the habit of individual and team contributions towards the development of the multi-disciplinary projects.
Action 1: Flipped class room practice is made mandatory for programming courses to enhance learning as an individual and among team. **Action 2:** Students are advised to form multidisciplinary groups in participations of hackathons and project expos.			
PO10: 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.			
PO10	**1.5**	**2.2**	Overall attainment of PO10 reached the target level. The communication, presentation, and report writing skills need to be more focused on respective theory and laboratory tasks.
Action 1: More assessment methods are incorporated to enhance oral communication in theory courses through Alternative Assessment Tools(AAT) such as seminar and concept videos. **Action 2**: Soft skills training is imparted to enhance various aspects of communication by group discussions, presentations and new learning outcomes. **Action 3**: Demonstration of experiment and viva are incorporated in laboratory day to day assessment.			
PO11: 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.			
PO11	**1.9**	**2.2**	Overall attainment of PO11 reached the target level.
Action 1: Awareness created among the students on applying learned engineering and management principles in their projects. **Action 2:** Students are encouraged to demonstrate their own project work in Project Exhibitions and Hackathons. **Action 3:** Students are advised to develop solutions to address the societal needs.			
PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the			

POs/ PSOs	Target Level	Attainment Level	Observations
broadest context of technological change**.**			
PO12	**1.5**	**2.2**	Overall attainment of PO12 reached the target level.
Action 1: Students are recognized the importance of self-learning and completed certifications and MOOC courses (NPTEL, CISCO, Udemy etc.) on the latest technologies. **Action 2:** Faculty are utilizing the available digital learning facilities in the form of videos (NPTEL, ELRV, Coursera etc.), software tools, to be on par with the recent trends. **Action 3:** Students are encouraged to take topics from magazines and journals for seminar and video topics, research oriented projects, refer research literature and present or publish their work.			
PSO1: Understand, design and analyze computer programs in the areas related to Algorithms, System Software, Web design, Big data, Artificial Intelligence, Machine Learning and Networking.			
PSO1	**1.5**	**2.1**	Overall attainment of PSO1 reached to the target level. It is observed that Computer Programming, Design and Analysis of Algorithms, Computer Networks, Linux Programming and Big Data and Business Analytics courses are attained nearer to target.
Action 1: Students are encouraged to practice tutorials and participate in coding challenges in Build IT regularly. **Action 2:** Programming Proficiency Assessment Tests, Hackathons and coding challenges are conducted to enhance their coding skills. **Action 3:** Collaborations with CISCO, Codechef and GeeksforGeek to encourage self-learning through open platforms for improving the programming and problem solving skills. **Action 4:** Guest lectures are organized by industry experts to bridge the gap between theoretical aspects and real-time applications.			
PSO2: Focus on improving software reliability, network security or information retrieval systems.			
PSO2	**1.6**	**2.1**	Overall attainment of PSO2 reached to the target level. It is observed that Web Technologies, Object Oriented Analysis and Design Patterns courses are attained nearer to target.
Action 1: Students are encouraged to participate in workshops and certifications related to the application development with security and information retrieval. **Action 2:** More emphasis has given on usage of different data handling and information retrieval techniques to improve the performance of the system.			
PSO3: Make use of modern computer tools for creating innovative career paths, to be an entrepreneur and desire for higher studies.			
PSO3	**1.5**	**2.1**	Overall attainment of PSO3 reached to the target level. It is observed that Computer Programming, Computer Networks and Software Testing Methodologies courses are attained nearer to target.
Action 1: Students are motivated to practice on Open Source Software. **Action 2:**			

POs/ PSOs	Target Level	Attainment Level	Observations
Guest lectures are organized by industry experts to get awareness on diversified career paths. **Action 3:** Awareness camps are organized on higher education and entrepreneurship .