INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad-500043

STRATEGIES FOR EDUCATION REFORMS

Institute of Aeronautical Engineering (IARE) is committed to delivering quality of engineering education by integrating experiential learning, interdisciplinary collaboration, and real-world relevance into its academic framework. Institute implements structured strategies to ensure that students acquire strong domain knowledge, foster critical thinking, engage in cross-disciplinary problem-solving, and contribute effectively to societal development.

Curriculum design in terms of various educational reforms such as:

1. Multidisciplinary and interdisciplinary approaches: Multidisciplinary and interdisciplinary approaches can be effectively incorporated into engineering education reforms by designing flexible curricula that allow students to explore courses across different disciplines. Institute can promote project-based learning by encouraging students from various branches to work together on real-world problems. Introducing integrated courses that combine multiple domains, along with skill-based and open electives, further strengthens this approach. Collaboration with industry through field projects / field practicum / internships provides practical exposure to cross-functional environments. Additionally, faculty development and support for interdisciplinary research help create a holistic learning ecosystem aligned with the goals of the National Education Policy 2020, ultimately producing well-rounded and industry-ready graduates.

2. APAAR and Academic Bank of Credits (ABC): Flexible and Connected Learning to facilitate student mobility and academic flexibility, IARE has implemented the APAAR ID system and enabled credit recording in alignment with the Academic Bank of Credits (ABC). Awareness sessions, detailed demonstrations, and faculty mentoring helped students complete their registration. These systems enhance student autonomy and support diverse learning pathways, encouraging participation in courses beyond traditional disciplinary boundaries.

3. Multi-point entry/exit options (MEME): Students enrolled in the 4-Year B.Tech. program are permitted to exit the program after successful completion of the second year (B.Tech. IV Semester). The students who desire to exit after the IV semester shall formally inform the exit plan one semester in advance i.e. at the commencement of IV Semester itself. Such students need to fulfil the additional requirements as described in 3.1.

Upon fulfilling the requirements like earning all the credits up to IV semester and successfully completing the additional requirements, the students will be awarded a 2-year undergraduate (UG) diploma in the concerned engineering branch.

3.1 Additional Requirements for Diploma Award

To qualify for the diploma under the exit option, students must also complete 2 additional credits through one of the following institute-prescribed pathways.

Work-based Vocational Course: Participation in a practical, hands-on vocational training program relevant to the engineering field, typically conducted during the summer term. **Internship / Apprenticeship:** Completion of a minimum 8-week internship or apprenticeship in their related field to gain practical industry exposure.

In addition, students must clear any associated course(s) or submit the internship/apprenticeship report as per the institute schedule and guidelines.

4. Indian Knowledge Systems (IKS): Enriching the curriculum with cultural insight IARE has introduced the Indian Knowledge Systems (IKS) course into the undergraduate curriculum to offer students a broader perspective on knowledge traditions. IKS encourages interdisciplinary thinking and critical reflection.

5. Skill Based Courses (SBC): These courses are structured training courses which help students to acquire practical abilities, competencies, and soft skills which are essential for academic, professional, and personal growth**.** It enhances students' practical skills, employability, and industry readiness alongside their regular academic curriculum. These courses focus on hands-on learning and application-oriented training in areas relevant to current industry needs. SBCs are usually offered as credit courses or add-on courses during B.Tech programs.

Four Skill Based Courses are included in the Curriculum in III, IV, V and VI semesters. The objective of Skill Courses is to develop the cognitive skills as well as the psycho-motor skills. Along with, the AI Futures initiative and strong emphasis on coding skills equip students with foundations in computing, data science, and intelligent systems through hands-on learning.

AI Futures: The world is undergoing rapid digital transformation driven by advancements in Artificial Intelligence and emerging technologies. At IARE, the AI Futures initiative equips students with strong foundations in computing, data science, and intelligent systems. Exposure to domains such as deep learning, natural language processing, robotics, and data analytics fosters innovation and interdisciplinary collaboration. This enables students to develop intelligent solutions for real-world challenges and contribute to the future of AI-driven technologies.

Coding: In the era of digital transformation, coding has become a fundamental skill for engineering graduates. At IARE, emphasis is placed on developing strong programming and problem-solving abilities through structured learning, hands-on practice, and industry-aligned training. Students are encouraged to engage in coding platforms, hackathons, and real-time projects to enhance logical thinking and innovation. This focus enables them to build efficient software solutions, adapt to evolving technologies, and meet global industry demands.

6. Recognition of prior learning (RPL): It is a process of assessing the skills and knowledge acquired by students through previous learning and experiences. It helps identify existing competencies before the start of a course. This avoids repetition of known topics and improves learning efficiency. RPL also supports better academic planning and skill development. It ultimately enhances student performance and career readiness.

7. Problem-Based Learning (PBL): a core instructional approach across its engineering programs. Students work in small teams to solve complex, real-world problems by integrating knowledge acquired from multiple courses. This model fosters self-directed learning, critical thinking, and collaboration, while enhancing students' ability to apply classroom knowledge to practical contexts. PBL is systematically embedded in course design, instructional methods, and assessment patterns across all years of study.

8. Student Learning Assessment Model (SLAM): Student Learning Assessment Models (SLAM) is a structured, outcome-based and project-driven learning framework designed to enhance experiential learning among students. It integrates theoretical knowledge with practical implementation and emphasizes continuous evaluation through multiple review stages. The SLAM framework ensures that students actively engage in identifying real-world problems, developing innovative solutions, and demonstrating measurable learning outcomes. SLAM includes research-oriented and application-based projects such as AI, Software Design, Community Projects, and Innovation Projects.

The following high-impact practices provide structured learning pathways for engineering students. Students may select one or more project categories from the list below based on their interests and academic requirements.

- Cornerstone Projects (CoPs)
- Side Project (SP)
- Technology Innovation and Product Support (TIPS)
- AI in Software Development Life Cycle (AI in SDLC)
- AI Agents
- Fundamental AI (FunAI)
- Software Engineering / Software Design Projects
- Vertically Integrated Projects (VIPs)
- Projects In Community Services (PICS)

Other curriculum educational reforms include:

- **Outcome Based Teaching & Learning**
- **Choice Based Credit System**
- **Curriculum Planning & Implementation**
- **Learning and Teaching Process**

- **Learning Resources**
- **Student Learning Pedagogy Implementation**
- **Spotlight on Student Research Experiences**
- **Powering Skills - High Impact Practices**
- **Real World Learning and Problem Solving**
- **Capstone Project**

9. Unnat Bharat Abhiyan (UBA): Connecting Classroom with Community Through its participation in Unnat Bharat Abhiyan, Institute has adopted nearby villages and engages faculty and students in identifying local challenges during field visits. These interactions offer firsthand exposure to real-world problems, allowing students to explore technological and social interventions through interdisciplinary collaboration.

IARE has been doing commendable work in rural areas of Medchal District and has successfully established Centres of Excellence for the improvement and enrichment of science and engineering knowledge – Alternative Energy Appliances for Rural India (AAERI), Low Cost Housing (LCH), Water and Environment Technology (WET), Soil and Material Testing (SMT). The activities of AAERI, LCH, WET and SMT carry out multidisciplinary research projects using integrated technologies with the prime aspiration of bringing "Science to the Society". The functions of these centres mainly focus on the development, management and conservation of natural resources, environment and ecology. UBA provides us a dream opportunity to channelize our energy with measurable outcomes.

Institute demonstrates a strong commitment to progressive education reforms by integrating multidisciplinary learning, academic flexibility, skill development, and experiential practices into its curriculum. Through initiatives such as APAAR and the Academic Bank of Credits, multi-entry and exit options, Indian Knowledge Systems, Skill-Based Courses, Recognition of Prior Learning, Problem-Based Learning, and the Student Learning Assessment Model, the institute ensures a holistic and student-centered learning environment. These strategies collectively enhance critical thinking, innovation, and industry readiness among students. By aligning with the vision of the National Education Policy 2020. Institute effectively prepares graduates to meet global challenges and contribute meaningfully to societal and technological advancement.

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