



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad-500043

STRATEGIES FOR EDUCATION REFORMS

At Institute of Aeronautical Engineering (IARE), curriculum design is driven by progressive education reforms aligned with NEP 2020 and Outcome-Based Education (OBE), ensuring the delivery of quality engineering education through well-structured and innovative academic practices.

Education reforms in curriculum design:

1. Multidisciplinary and Interdisciplinary approaches
2. Use of credit mobility and Multi-point entry/exit options (MEME)
3. APAAR and Academic Bank of Credits (ABC)
4. Indian Knowledge Systems (IKS)
5. Skill Based Courses (SBL)
6. Transformation brought by AI (TAI)
7. Digital Transformation (DT)
8. Research Initiatives (RI)
9. Recognition of prior learning (RPL)
10. Problem-Based Learning (PBL)
11. Student Learning Assessment Model (SLAM) – Projects / Products
12. Unnat Bharat Abhiyan (UBA)
13. Accreditation Standards (AS)
14. International Collaborations (IC)

1. Multidisciplinary and interdisciplinary approaches:

Multidisciplinary and interdisciplinary approaches are integrated into curriculum in the Institute through flexible curricula that include open electives, skill-based courses, and integrated domain-specific courses. Institute promotes project-based learning by encouraging collaboration among students from different disciplines to address real-world problems. Industry-linked activities such as internships, field projects, and practicum further enhance cross-functional exposure. Additionally, faculty development and interdisciplinary research initiatives support a holistic learning ecosystem aligned with NEP 2020, producing industry-ready graduates.

The following initiatives are taken into consideration:

Multidisciplinary	Interdisciplinary
Projects In Community Services (PICS)	Cornerstone Projects (CoPs)
Technology Innovation and Product Support (TIPS)	Side Project (SP)
Vertically Integrated Projects (VIPs)	Software Engineering / Software Design Projects
Summer Research Internship Projects (SRI)	
Full Semester Internship (FSI)	

2. APAAR and Academic Bank of Credits (ABC):

Flexible and integrated learning frameworks are implemented to enhance student mobility and academic flexibility. Institute 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.

The following initiatives are taken into consideration:

- Mandatory for all students to be enrolled in APAAR and the Academic Bank of Credits (ABC).

3. Use of credit mobility & Multi-point entry/exit options (MEME):

Students enrolled in the 4-year B.Tech program are permitted to exit after successful completion of the second year (IV Semester) under the Multiple Entry and Multiple Exit (MEME) scheme. Students intending to exit must formally declare their decision one semester in advance, i.e., at the commencement of the IV Semester. Upon earning all required credits up to the IV Semester and fulfilling additional requirements such as internship or vocational training (described in 3.1), students will be awarded a 2-year Undergraduate Diploma in the respective engineering discipline.

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):

Indian Knowledge Systems has introduced as per AICTE guidelines, aim to integrate India's rich cultural, scientific, and traditional knowledge into modern engineering education. The IKS course enables students to develop holistic thinking, ethical values, and interdisciplinary perspectives by connecting ancient knowledge with contemporary applications.

In the Institute, IKS is incorporated into the curriculum to enrich students with cultural insights, critical thinking, and value-based education.

The initiatives are taken and courses included in curriculum are:

1. Essence of Indian traditional knowledge
2. Gender Sensitization
3. Environmental Science
4. Indian Knowledge Systems

These courses promote curriculum diversification, experiential learning, and alignment with Outcome-Based Education (OBE), thereby supporting education reforms and enhancing students' societal and global outlook.

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.

Four Skill Based Courses are included in the curriculum in III, IV, V and VI semesters. The objective of SBC 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.

6. Transformation brought by AI (TAI):

The world is undergoing rapid digital transformation driven by advancements in Artificial Intelligence and emerging technologies. At IARE, the AI 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.

The following initiatives are taken into consideration:

- Artificial Intelligence
- Big Data Analytics
- Data Science
- Natural Language Processing
- AI Futures
 - AI in Software Development Life Cycle (AI in SDLC)
 - AI Agents
 - Fundamental AI (FunAI)

7. Digital Transformation (DT):

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 made to engage in coding platforms, hackathons, and real-world 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.

The following initiatives are taken into consideration:

- Tech talks
- Certifications
- E-portfolios
- Hackathons
- MOOCs

8. Research Initiatives (RI):

Research Initiatives play a vital role in strengthening academic quality and supporting Outcome-Based Education (OBE). Institute promotes a strong research culture through dedicated R&D centers, funded projects, and interdisciplinary research in emerging areas such as AI, cyber security, aerospace etc.

The following initiatives are taken into consideration:

- Prototype and Design Building
- Engineering Design Project
- Engineering Development Project
- Summer Research Internship (SRI) projects
- Publications in journal articles / conference
- Patents / Copyrights

This made faculty and students to engage in publications, patents, consultancy, and innovation-driven activities. Structured initiatives like Summer Research Internships, Vertically Integrated Projects, and industry-linked research enhance experiential learning. These efforts align with NBA requirements by fostering innovation, industry collaboration, and research-oriented learning.

9. 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.

10. Problem-Based Learning (PBL):

It is a core instructional approach across 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 in to practical contexts. PBL is systematically embedded in course design, instructional methods, and assessment patterns across all years of study.

11. Student Learning Assessment Model (SLAM) Projects / Products:

Student Learning Assessment Models 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 reviews. It 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.

12. 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.

Institute 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.

13. Accreditation Standards (AS):

Accreditation standards in engineering education emphasize Outcome-Based Education (OBE) with clearly defined, measurable outcomes and a strong focus on continuous improvement. In alignment with these standards, the institute adopts a multidisciplinary, industry-oriented curriculum supported by innovative teaching–learning practices and robust assessment mechanisms. It ensures effective governance, competent faculty, adequate infrastructure, and comprehensive student support systems. Periodic evaluation by National Board of Accreditation and National Assessment and Accreditation Council ensures quality assurance and benchmarking. These standards drive educational excellence by fostering research, innovation, industry engagement, and enhanced graduate employability.

The following initiatives are taken into consideration:

- Case Studies and Real-Life Examples
- Seminar and Student Learning Assessment Models: Projects / Products
- Solving Complex Engineering Problems
- SWAYAM / NPTEL / MOOC / Self Learning

14. International Collaborations (IC):

International Collaborations are systematically integrated into the curriculum to enhance global exposure, academic quality, and alignment with international standards. The institute incorporates international inputs through joint research initiatives, student and faculty exchange programs, and full-semester internships with global universities. These initiatives promote curriculum internationalization, adoption of global best practices, and integration of emerging technologies. Consequently, the curriculum is aligned with Outcome-Based Education (OBE), fostering global competencies and enhancing graduate employability.

The internationalization strategy at the institute is founded on the four pillars: research, education, cultural engagement, and skill development. This strategy is also reflected in the objectives of MoUs as given below:

- Development of collaborative research
- Organization of seminars, workshops, and other meetings on specific topics
- Exchange of students
- Exchange of research scholars
- Exchange of faculty members
- Full semester Internship (FSI)

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](#)

Institute demonstrates a strong commitment to progressive education reforms by integrating multidisciplinary learning, academic flexibility, skill development, and experiential practices into its curriculum. 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.
