Nirma University
Institute of Technology
School of Engineering

Institutional Development Plan of School of Engineering (2025 – 30)

Executive Summary

The Institutional Development Plan (IDP) 2025-30 for the School of Engineering, Institute of Technology, Nirma University outlines a strategic roadmap to enhance academic excellence, research innovation, industry collaboration, and holistic student development. Aligned with NEP 2020, UN Sustainable Development Goals, and national priorities, the plan focuses on equipping students with future-ready skills, fostering interdisciplinary research, strengthening industry partnerships, and integrating emerging technologies into the curriculum. It emphasises student-centric learning, global exposure, sustainability, and social responsibility, ensuring that graduates are not only technically proficient but also socially conscious innovators.

The key goals of the plan include enhancing student experience, empowering faculty through research and industry exposure, promoting start-ups and patents, and upgrading infrastructure and global visibility. By fostering collaborations with leading academic institutions and industries, promoting international exchanges, and continuously benchmarking against top institutions, the School aims to position itself among the top 100 engineering institutions in India while building a globally competitive, socially responsible, and innovation-driven academic ecosystem.

In alignment with the NEP 2020, the School of Engineering emphasises the integration of emerging fields such as Artificial Intelligence, Internet of Things, renewable energy systems, and sustainability into its academic framework. Through strong industry-academia partnerships, the School facilitates practical learning, internships, and research collaborations, creating a vibrant ecosystem that promotes employability, entrepreneurship, and social consciousness. A commitment to interdisciplinary approaches, global partnerships, and digital transformation further underpins the strategic direction of the School.

The IDP is shaped by extensive internal reviews, benchmarking exercises with premier national and international institutions, consultations with stakeholders, and careful analysis of political, economic, social, technological, and regulatory trends. The strategic roadmap identifies the need to strengthen academic flexibility, research output, faculty development, and community

engagement, while fostering a culture of innovation, sustainability, and lifelong learning among students.

The School's development goals include enriching the student experience through flexible academic pathways and global opportunities, promoting faculty empowerment with industry exposure and international collaborations, advancing research and innovation with a focus on interdisciplinary centres and startups, and enhancing infrastructure to support cutting-edge education and attract international students. The monitoring of progress will be systematic and rigorous, with School-Level and Department-Level Committees tracking key performance indicators, ensuring alignment with national standards, and fostering a culture of continuous improvement.

By nurturing a globally competitive, socially responsible academic community, the School of Engineering, Institute of Technology, Nirma University aspires to significantly enhance its standing nationally and internationally by 2030, contributing meaningfully to India's growth and the global pursuit of sustainable development.

1. Need for the Institutional Development Plan

In this dynamic environment of technological evolution and societal transformation, the institution is committed to developing a forward-thinking strategy that aligns with the priorities of the Anusandhan National Research Foundation (ANRF) - Department of Science and Technology (DST-India), the National Education Policy (NEP) 2020, and the United Nations Sustainable Development Goals (UN SDGs). This strategy emphasises student-centric learning, robust industry connections, leadership development, employability enhancement, and the pursuit of global academic excellence.

The school and the institution envision empowering students through transformative and inclusive learning experiences. By adopting innovative pedagogies, integrating emerging technologies such as AI, IoT, and renewable energy systems, and fostering interdisciplinary approaches, the institute aims to cultivate a generation equipped with skills, knowledge, and problem-solving abilities necessary for a sustainable and equitable future.

Aligned with NEP 2020, the school and the institute seek to create an environment that promotes flexibility, creativity, and critical thinking while offering holistic and

multidisciplinary education. Recognising the DST's focus on advancing research and innovation, the institute will prioritise projects addressing societal challenges, particularly those related to climate action, clean energy, smart cities, and inclusive development, in harmony with the UN SDGs.

The school acknowledges the pivotal role of strong industry partnerships in achieving these objectives. By engaging industries in curriculum design, offering practical training, facilitating internships for students and faculty, and promoting real-world collaborative projects, the institute aims to bridge the gap between academic knowledge and industry demands.

In its quest for excellence, the institute is dedicated to enhancing faculty research output, attracting and nurturing top talent, expanding state-of-the-art infrastructure, and amplifying its presence on national and international platforms. These efforts are directed towards elevating the institution among the leading and top-ranking engineering institutes globally.

The strategic goals and initiatives will focus on strengthening student learning, enhancing placements, fostering innovation, building a robust industry network, and improving the institute's contributions to society. By working collaboratively with faculty, students, alums, industry partners, and other stakeholders, the institute will drive progress in engineering education and research, contributing meaningfully to India's growth story and the global pursuit of sustainable development.

2. Process of Development of Institutional Development Plan

Institutional Development Planning Process

The Institutional Development Plan for the School of Engineering, Institute of Technology, was crafted through extensive discussions with both internal and external stakeholders. A detailed analysis of educational trends, the rationale behind discipline selection by incumbents, the industry's current and future trends, changing placement processes and needs, etc., was undertaken to assess the talent nurturing and the institute's growth. In addition, the development of the Institutional Development Plan involved a careful review of several policy documents and reports published by government and non-government organisations. Some of the key references include:

- National Education Policy 2020
- Engineering Education In India – Short & Medium Term Perspectives, AICTE
- Improving the Culture of Research and Development (R&D) in State Universities and Institutes, Niti Ayog
- UGC Guidelines for Institutional Development Plans for Higher Education Institutions (HEIs), 2024
- Guidelines for Transforming Higher Education Institutions into Multidisciplinary Institutions, UGC, Sept. 2022
- National Education Policy (NEP) 2020, MHRD, GoI
- National Credit Framework (NCrF), UGC, April 2023
- UN Sustainable Development Goals
- Science, Technology, and Innovation Policy (Draft), Govt. of India, 2020
- Science, Technology and Innovations Policy, DST, Govt. of Gujarat, 2018
- Perspective Plan, Nirma University 2020 - 2030
- AICTE Model Curriculum of Courses at UG Level in Emerging Areas

Further, a gap analysis was carried out internally, and the emerging points are –

- Rapid advancements in technology (e.g., AI, data science, robotics) are not sufficiently integrated into mainstream engineering education
- Interdisciplinary and multidisciplinary research focus needs improvement
- National and International Collaborations need a turnaround
- Limited Focus on Practical and Applied Learning
- Inadequate Soft Skills and Professional Development
- Sustainability and Social Responsibility for Holistic Development
- Limited Industry Engagement, industry exposure to faculty

The plan was developed through in-depth discussions and deliberations at multiple levels. Besides department heads, senior faculty members were actively involved in the planning process. Academic leaders played a key role in identifying strategic goals, objectives, and milestones, contributing significantly to the plan's development. Additionally, feedback—both direct and indirect—from various stakeholders, including academic peers, industry professionals, alumni, and students, was carefully considered in finalising the Institutional Development Plan.

3. Environmental Analysis

The progress and growth of an engineering institute depend significantly on its ability to anticipate, understand, and respond to the dynamics shaping its operational and academic environment. The Environment Analysis serves as a vital component of the institutional development planning process, enabling the institute to align its vision, mission, and objectives with external realities. This analysis examines the broader macro-environment through four key lenses - Political, Economic, Social, and Technological - collectively providing a comprehensive understanding of the factors influencing the institute's planning, competitiveness, and societal impact.

The government policy directions, regulatory frameworks, and educational mandates shape institutional priorities. The economic analysis evaluates resource availability and market trends that influence the expansion prospects of the institute. Social factors highlight societal expectations and cultural trends affecting the learning ecosystem, student engagement, and industry relationships. Rapid advancements and innovations that redefine engineering education, research capabilities, and industry collaboration require due consideration.

The school is required to align with international trends and opportunities to remain competitive and relevant. It is imperative to adopt the current trends of globalisation of engineering education through collaborative programmes, cross-border faculty and student mobility for fostering global exposure and knowledge sharing. There shall be an emphasis on sustainability and global challenges, integration of emerging technologies like Industry 4.0, AI, IoT, robotics, and additive manufacturing and digital engineering for core engineering disciplines. Inclusion of Virtual and Augmented Reality (VR/AR), data-driven learning, and MOOCs in the curriculum for the global workforce, skill development, and lifelong learning is becoming essential. The students shall be offered a strong Research and Innovation Ecosystem for Research Funding, Technology Transfer and Commercialisation; Innovation Hubs and Start-ups to make them thoughtful citizens, a global leader helping the world be a better living place.

These insights form a foundation for informed decision-making, proactive risk management, and strategic positioning, ensuring that the institute not only adapts to change but also leverages opportunities for leadership in education, research, and innovation.

4. PEST Analysis

4.1 Political Scenario

The Indian political scenario is deeply intertwined with the state of core engineering education, shaped by a combination of government policies, socio-economic challenges, and evolving industrial demands. It emphasises modernising core engineering education by integrating sustainability, promoting research, and addressing skill gaps. However, disparities in implementation and resource allocation remain key challenges. The essential aspects of the political scenario are –

1. Policy framework and Skill initiatives - Implementation of NEP (2020) to promote interdisciplinary education and research in engineering, integrating management and humanities, Skill India, Digital India, and R&D-focused schemes such as IMPRINT, etc., to enhance employability and encourage innovation. The political commitment to sustainability strongly influences engineering curricula with a focus on renewable energy, smart grids, and green technologies.
2. Out of the funding offered by the Government through various schemes, flagship institutions like IITs and NITs benefit the most. However, there are state-level disparities in the impact of the financing of the quality of education in many states, particularly in private engineering colleges.
3. Industry-Academia Collaboration: Policies like Make in India and PLI (Production Linked Incentive) encourage collaborations, internships, and technology transfers between industry and academia.

The funding for research and development by the central government is less than 1% of GDP, significantly less than other emerging and developed nations. Insufficient budgetary provisions, lack of proper execution of policies and initiatives, and a persistent challenge of skill gap in Tier-II and Tier-III colleges, and overemphasis on IT and software sidelines core engineering disciplines. Strengthening the tie between policy, industry, and academia will be crucial to ensuring that engineering graduates contribute effectively to India's global aspirations.

4.2 Economic Scenario

The Indian economic scenario is deeply connected to the state of core engineering education, as it directly influences the nation's ability to meet domestic and global talent demands, adapt

to technological advancements, and drive sustainable growth. The economic progress is inherently tied to its ability to produce a workforce of innovative and adaptable engineers. By leveraging its demographic dividend and focusing on emerging technologies, the country can play a central role in shaping the future of global engineering talent.

The role of core engineering is becoming pivotal as it drives infrastructure, energy, and manufacturing sector growth, thus driving the country's GDP and restricting the inflow of imports. The **e**merging fields, such as renewable energy, Industry 4.0, innovative infrastructure, and the digital and green economy, are reshaping job markets. The critical considerations are -

1. Employment Trends are quite promising as the traditional engineering roles are evolving due to automation and digitisation. The green energy and intelligent systems are creating demand for engineers skilled in AI, robotics, and sustainable technologies.
2. Public-Private Partnerships and collaboration between government, academia, and industry will drive innovation and enhance the employability of engineers.
3. Global Talent and Competitiveness is well proven, as the Indian engineers are globally sought after for multifaceted leading roles. The start-up culture and the states' courage for entrepreneurship have been a great motivator.
4. The reports from the World Economic Forum highlight the need for interdisciplinary skills combining engineering with data science and environmental science.

The challenge lies ahead as skill mismatch exists and automation threatens traditional roles. The nation is emerging as a global hub for engineering services and start-ups in med-tech, space and clean energy, which is an excellent opportunity to avoid the brain drain. Aligning Indian engineering curricula with global standards will help position India as a leader in engineering talent export.

4.3 Social Scenario

The social scenario in India significantly influences the dynamics of core engineering education, shaping students' choices, outcomes, and the broader societal implications. In essence, engineering education in India is not just an academic pursuit but a complex interplay of societal values, economic aspirations, and cultural norms. Transforming these dynamics will be key to building a more inclusive and innovative engineering ecosystem.

The peer guided and societal pride drive the parental expectations broadly. Engineering is viewed as a prestigious and secure career, driven by societal expectations and success stories in manufacturing, IT and global markets. Families often prioritise engineering over alternative careers, leading to intense pressure on students. The perspective about engineering in the rural segment is far different vis-à-vis that of urban society expectations. The social aspects tied to core engineering education are analysed in the following:

1. The present-day student psychology has changed significantly. High competition, challenging entrance examinations and societal comparisons lead to stress and mental health issues. A shift in aspirations is seen towards post-graduation in the diversified domains, and engineering forms the stepping stone.
2. The engineering institutes have been seeing gender imbalance for decades due to society's reservations about the shopfloor working of the girl child. The **w**omen remained underrepresented in core engineering fields, though participation is higher in IT-related disciplines. In recent years, the dynamics have been changing with the mindset of openness and awareness, now improving the gender ratio thanks to the government initiatives, female-only quota (including supernumerary) and special drives by companies offering placements to female candidates.
3. The rural-urban divide is visible across states as the urban students have better access to quality education, resources and finance. In contrast, rural students face challenges like inadequate infrastructure, digital access and limited income sources. The concentration of the academic institutes in the urban areas limits access to education for rural populations. Vernacular language students find it challenging to clear competitive examinations and have a poor success rate compared to English-speaking students from urban backgrounds. The limited knowledge about the economic trends, the prospect of various disciplines and multi-disciplinarity, the pay parity over experience, etc., prevents rural students from opting for the core engineering disciplines. The promotion of science in rural areas at the school level needs significant improvement, too.
4. The social structure promotes entrepreneurship, and the youth of the state is prepared for mobility across locations, offering the skills, services and sectoral dividends.

4.4 Technological Scenario

The rapid pace of technological advancement and its integration across engineering disciplines present both challenges and opportunities for the School of Engineering. With core engineering fields such as Civil, Mechanical, Electrical, and Chemical Engineering forming its foundation, the School must strategically align its vision with emerging technologies and industry trends to remain relevant and impactful.

The following key elements form the basis for the strategies -

3.1 Emerging Technologies and Core Integration
3.2 Focus on Sustainable Engineering
3.3 Interdisciplinary Collaboration
3.4 Digital Transformation in Engineering Practices
3.5 Skill Development and Future Readiness
3.6 Resilient Infrastructure and Disaster Preparedness
3.7 Global Trends and Regional Relevance

To stay at the forefront of technological progress, the School of Engineering must:

- Invest in cutting-edge laboratories and infrastructure tailored to advanced research in core disciplines.
- Foster collaborations with industries, government bodies, and international academic institutions to drive innovation.
- Design curricula that balance core engineering fundamentals with emerging technologies.
- Encourage entrepreneurship and technology-driven startups among students and faculty.

India's political, economic, social and technological landscapes play a critical role in shaping core engineering education. Policies emphasising sustainability, innovation, and inclusivity aim to modernise education and align it with global standards. However, challenges like skill gaps, regional disparities, and societal pressures must be addressed to realise the potential of India's engineering ecosystem fully.

5. Developmental Goals

The goals of the school are defined to enhance student learning experience, academic quality, expand research impact, strengthen industry linkages, and contribute meaningfully to regional and global development.

Goal-1: Enriching Student Experience

(Academic Enabler, UN SDGs – 4, 5, 9, 17)

Strategy - 1. To offer academic flexibility to students through MOOCs

Strategy - 2. To facilitate participation in competitions

Strategy - 3. To foster personality development

Strategy - 4 To promote social responsibility

Goal-2: Professional Growth and Faculty Empowerment

(Academic Enabler, UN SDGs – 4, 5, 9,17)

Strategy - 1. To enhance research and industry exposure for faculty members

Strategy - 2. To develop e-content / MOOCs

Strategy - 3. To offer multidisciplinary training programmes

Strategy - 4. To promote international exposure to faculty members

Goal-3: Research, Innovations and Start-ups

(Research, and Intellectual Property Enabler, UN SDGs – 6, 7, 9, 11, 13, 17)

Strategy - 1. To enhance journal research publications

Strategy - 2. To increase externally funded projects

Strategy - 3. To promote intellectual property creation

Strategy - 4. To establish interdisciplinary research centres

Strategy – 5 To nurture a start-up ecosystem

Goal-4: Infrastructure and Visibility

(Physical Enabler, Networking and Collaboration Enabler, UN SDGs – 4, 9, 17)

Strategy - 1. To upgrade laboratory and software facilities

Strategy - 2. To foster alumni connections

Strategy - 3. To enhance ties with industries

Strategy - 4. To organise reputed conferences in collaboration with professional bodies / foreign universities

6. Monitoring and Alignment: Structure and Systems

The School of Engineering, Institute of Technology, is very serious about implementing and monitoring the progress of the Institutional Development Plan. The plan will be implemented and closely monitored at two levels,

School Level Core Team

The School Level Core Team will have the following members:

- Director, SoE
- All HoDs
- Institute IQAC Coordinator

The School Level Core Team will meet at least once every six months and review the progress of the Institutional Development Plan. The Core Team will guide the Department Level Committees in the effective implementation of the Plan. The progress reports received from the Department Level Committees will also be discussed in the School Level Core Team, and the progress report will be submitted to the University.

Department Level Committee

The Department Level Committee will have the following members:

- Head of the Concerned Department
- Senior Faculty/PG Coordinators
- Department IQAC Coordinator

The Department Level Committee will hold review meetings regularly (at least twice in six months) and see that the plan is implemented effectively. The Committee will discuss the progress, the department's difficulties, probable solutions, new initiatives to be taken, etc. The Committee will also send its report to the School Level Core Team.