The newly introduced Bachelor of Engineering (B.E.) in Environmental and Sustainability Engineering at BITS Pilani is a forward-looking programme designed to equip students with the knowledge and skills required to address global environmental challenges, sustainability goals, and emerging industry demands. This interdisciplinary programme integrates engineering, environmental science, policy, and management to develop sustainable solutions for a greener future.

This program provides students with a comprehensive foundation in engineering principles, focusing on environmental problem-solving and sustainable technologies. Students will gain expertise in key areas such as environment and renewable energy, natural resource and disaster management, waste treatment, and climate change while integrating modern tools like environmental data analysis, remote sensing and GIS, and modelling for sustainable development. This program prepares graduates for careers in the rapidly growing field of sustainability engineering, enabling them to design and implement solutions that address critical global environmental challenges.

The need for the program arises from the urgent global challenges of environmental degradation, climate change, and resource depletion, which require innovative engineering solutions. In the Indian context, rapid industrialization, urbanization, and increasing pollution highlight the critical need for sustainable infrastructure and technologies.

The **B.E. in Environmental and Sustainability Engineering** at BITS Pilani is a **pioneering programme** that blends **engineering, science, policy, and technology** to develop **sustainability leaders of the future**. By combining **theoretical depth with practical exposure**, this programme prepares graduates to **drive innovation, create sustainable solutions, and contribute meaningfully to global environmental challenges**.

Key Strengths of the Programme

1. Multidisciplinary Curriculum Aligned with Global Standards

- The programme covers a broad spectrum of topics, including environmental engineering, renewable energy, climate change, sustainable infrastructure, pollution control, and green technology.
- Offers flexibility in course selection, allowing students to choose from a wide range of electives based on their interests and career aspirations.

2. Industry-Oriented and Research-Driven Approach

- Strong industry collaborations ensure that students work on **live projects, case studies, and real-world environmental challenges**.
- The curriculum integrates **hands-on learning** through:
    - **State-of-the-art laboratories** for environmental monitoring and sustainability analysis.
    - **Internships and industry projects** with leading organizations in sustainability, waste management, renewable energy, and climate resilience through **Practice School Programmes**, where students engage in structured industrial training.

- Opportunities to participate in **cutting-edge research** in areas such as **carbon neutrality, circular economy, and smart water management**.

3. Strong Emphasis on Sustainability and Green Technologies

- The programme is aligned with **United Nations Sustainable Development Goals (SDGs)** and national environmental policies.
- Courses focus on **climate resilience, carbon footprint reduction, sustainable urban planning, and waste-to-energy innovations**.
- Students gain expertise in emerging fields like **AI and IoT applications in sustainability, energy-efficient systems, and green building technologies**.

4. Flexibility for Students from PCB and PCM Backgrounds

- The curriculum is designed to **accommodate students from both PCB (Physics, Chemistry, Biology) and PCM (Physics, Chemistry, Mathematics) backgrounds**.
- Foundational bridge courses in **mathematics, computational methods, and environmental sciences** ensure a **smooth transition** for all students.

5. Cutting-Edge Electives and Specialization Opportunities

- Students can **specialize in emerging areas** through discipline electives such as:
    - **Sustainable Water Resource Management**
    - **Green Energy and Renewable Systems**
    - **Climate Change Adaptation and Mitigation**
    - **Circular Economy and Waste Management**
    - **Environmental Policy and Sustainable Development**
- Availability of **interdisciplinary minors** in **Computational Sustainability, AI for Climate Science, Environmental Economics, and Sustainable Finance** enhances career prospects.

6. Career Prospects in High-Growth Sectors

- Graduates of this programme will be in high demand in diverse fields such as:
    - **Environmental consulting and policymaking**
    - **Sustainable infrastructure and urban planning**
    - **Renewable energy and climate change mitigation**
    - **Smart cities and sustainable transportation**
    - **Corporate sustainability management**
    - **Research and development in environmental engineering**

- Strong **placement support and industry networking** ensure excellent career opportunities in top companies, research institutions, and government agencies.

With the growing integration of Nanotechnology and Semiconductor Science across all Science and Engineering domains, there is a pressing need for an integrated first-degree programme that strengthens the talent pool, especially when paired with an Engineering degree. Additionally, with the launch of the National Quantum Mission, significant industrial expansion is expected, creating a high demand for specialized expertise in Nano and Semiconductor technologies.

To bridge this gap, BITS Pilani has introduced the M.Sc. in Semiconductor & Nanoscience for PCM students. This interdisciplinary programme blends scientific fundamentals with cutting-edge technology, offering students research-driven learning and industry-focused training to prepare them for emerging opportunities in this rapidly evolving field.

Objectives:

- To provide students with in-depth understanding in the state-of-the-art of current research trends in nanoscience and technology.
- To enable students to acquire adequate expertise through hands-on experience and outcome-oriented projects, thesis work and/or Practice School.
- To prepare suitable manpower for academic and industrial requirements.

Uniqueness:

The programme is highly interdisciplinary and aims to deliver the knowledge of different domains including chemistry, mathematics, material science, electronics engineering, chemical engineering, and biosciences to the students.

Requirement:

In current scenario of academic and industrial research requires train manpower in interdisciplinary areas. The industries are looking for candidates who are well-trained in scientific fundamentals as well as have strong base for technological aspects. This proposed programme will enable students to contribute to industries who are working applied research, translation of ideas, and fabrications of devices.

The **Integrated M.Sc. in Semiconductor and Nanoscience at BITS Pilani** is a **pioneering programme** designed to bridge the gap between **fundamental research, industry innovation, and next-generation technology development. With cutting-edge curriculum, world-class research facilities, strong industry collaborations, and global exposure**, this programme will shape future leaders in the **semiconductor and nanotechnology domains**, driving India□s vision of **self-reliance in semiconductor manufacturing and advanced materials research**.

Employment:

In BITS Pilani, companies actively recruit students who have fundamental knowledge and have practical knowledge for current technologies. Various missions launched by Indian Government for Semiconductor materials, Quantum materials & devices, Electric vehicles, hydrogen production & sensing, and Solar energy utilization have expedited an eco-system working in these directions. There

will a huge demand of trained manpower in near future which can be cater by this programme. The potential recruiters may be Intel, TSMC, IBM, ST Microelectronics, Freescale, Oxford Instruments Plasma Technology, ASM, and Applied Materials, Tata, Reliance, Adani etc.

Key Strengths of the Programme

1. Industry-Aligned Curriculum with Multidisciplinary Focus

- The programme offers a strong foundation in physics, chemistry, and materials science while integrating advanced coursework in semiconductor technology, nanofabrication, and nanoelectronics.
- Core topics include Quantum Mechanics, Solid State Physics, Semiconductor Device Physics, Nanomaterials, Thin-Film Technology, MEMS/NEMS, and Advanced Lithography Techniques.
- Exposure to AI/ML-driven semiconductor design, photonics, and quantum computing applications makes this a futuristic programme.

2. Hands-on Training with State-of-the-Art Infrastructure

- Students will gain practical exposure to nanofabrication and semiconductor processing through access to cleanroom facilities, thin-film deposition labs, and high-resolution electron microscopy labs.
- Industry partnerships enable hands-on experience in fabrication, characterization, and computational modeling of semiconductor devices.

3. Strong Industry Collaboration & Global Research Exposure

- BITS Pilani has strategic collaborations with leading semiconductor companies such as Intel, TSMC, GlobalFoundries, Applied Materials, and Texas Instruments.
- Through the Practice School programme, students get industry experience in semiconductor fabrication, IC design, and MEMS/NEMS technology.
- Students have opportunities to work on research collaborations with top global universities and semiconductor R&D centers.

4. Focus on Emerging Technologies & Innovation

- The programme integrates courses and research opportunities in:
    - **2D Materials & Graphene Electronics**
    - **Quantum Dots & Nanophotonics**
    - **Neuromorphic & Spintronics Devices**
    - **Flexible & Wearable Electronics**
    - **Energy Harvesting & Nanogenerators**
    - **Carbon Nanotube and Molecular Electronics**

5. Research-Driven Approach & Thesis Component

- The programme emphasizes a strong research component, allowing students to work on thesis projects in cutting-edge areas such as next-generation transistors, quantum computing materials, and nano-biotechnology.
- Collaboration with BITS Pilani's Centre for Research Excellence in Semiconductor Technology (CREST) and other interdisciplinary research centers provides students with real-world problem-solving experience.

6. High-Impact Career Opportunities

- Graduates from this programme are well-positioned for careers in:
    - **Semiconductor & Microelectronics Industry (Chip Design, IC Fabrication, Lithography, MEMS/NEMS, Semiconductor Packaging & Testing)**
    - **Nanotechnology R&D (Quantum Computing, Photonics, Energy Storage, Sensors, Bio-Nanotechnology)**
    - **Academia & Research Institutes (Ph.D. Pathways in Advanced Materials & Nanoelectronics)**
    - **Startups & Deep-Tech Entrepreneurship (Innovation in Flexible Electronics, Neuromorphic Computing, and Smart Materials)**

Fees	Pilani Campus	Goa Campus	Hyderabad Campus
Admission Fees	60,500/-	60,500/-	60,500/-
Semester/Term Fees			
First Semester	2,75,000/-	2,75,000/-	2,75,000/-
Second Semester	2,75,000/-	2,75,000/-	2,75,000/-
Summer term (if Registered)	96,300/-	96,300/-	96,300/-
Student's Union fee (Annual)	450/-	450/-	450/-
Student's Aid Fund (Annual)	225/-	225/-	225/-
Hostel fee (for on-campus students only)			
First Semester	32,700/-	32,700/-	32,700/-

Second Semester Summer term (if Registered)	32,700/- 16,350/-	32,700/- 16,350/-	32,700/- 16,350/-
Mess & Electricity advance First Semester Second Semester Summer term (if Registered) *(Payable at the beginning of each semester/term and adjustable at the end of the same)*	10,000/- 10,000/- 5,000/-	10,000/- 10,000/- 5,000/-	10,000/- 10,000/- 5,000/-
Other Advances First Semester Second Semester *(Payable at the beginning of each semester/term and adjustable at the end of the same)*	12,000/- 12,000/-	12,000/- 12,000/-	12,000/- 12,000/-
Institute Caution Deposit	3,000/-	3,000/-	3,000/-

Notes: (Applicable to Pilani, K K Birla Goa, and Hyderabad Campus candidates)

1.	The above prescribed semester fees is for the Integrated First Degree students admitted in the academic year 2025-26. For these students, the Semester Tuition, Summer Term and Hostel fees will be revised upward every year. The details of semester tuition fee and summer term fee is given below (unless the government announces any new levy/tax, which will be passed on to all existing students irrespective of their year of entry).

<table>
<tr><td></td><td>
<table>
<tr><td colspan="6">Tuition fees per semester & summer term fee (if it is required to register in summer) for the students admitted in academic year 2025-26 [for Domestic students] (Amount in INR)</td></tr>
<tr><td>Academic Year of admission</td><td>AY 2025-26</td><td>AY 2026-27</td><td>AY 2027-28</td><td>AY 2028-29</td><td>AY 2029-30</td></tr>
<tr><td>Semester Tuition Fee</td><td>2,75,000/-</td><td>2,88,500/-</td><td>3,02,500/-</td><td>3,17,500/-</td><td>3,33,000/-</td></tr>
<tr><td>Summer Term Fee</td><td>96,300/-</td><td>1,01,000/-</td><td>1,05,900/-</td><td>1,11,100/-</td><td>1,16,600/-</td></tr>
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</td></tr>
<tr><td>2.</td><td>Summer Term Tuition Fee will be 35% of Semester Tuition Fee in corresponding Academic Year. All three Indian campuses will have the same summer term fee in an academic year. It is to be noted that every summer term is not part of the academic calendar except where specifically stated. Though the prescribed summer term fee for domestic students is mentioned above, depending on the requirement of registration of a student in a given summer term, he/she will be required to pay summer term fee for that particular academic year only.</td></tr>
<tr><td>3.</td><td>If a student is admitted to a second degree programme under dual degree scheme, the candidate has to pay admission fees of the second programme at the time such admission is made.</td></tr>
<tr><td>4.</td><td>If a single degree student registers for PS II in a Semester, such candidate has to pay the semester fees of the batch for that semester plus additional fees of summer term of previous academic year because the practice school is longer than a semester and extends it to summer (i.e. about 35% of the Semester fees of the previous Academic Year).</td></tr>
<tr><td>5.</td><td>All fees are to be paid in advance. Only caution deposit and mess advance are refundable after adjustment of dues at the time of graduation or withdrawal from the Institute. This applies to prospective candidates who are seeking admission as well as ongoing students of the Institute.</td></tr>
<tr><td>6.</td><td>Course-wise Fees (Per Course): Rs. 5,500/- (Applicable to only certain limited courses outside academic requirement after paying full semester fees. No semester fee is computable on the basis of course wise fees).</td></tr>
<tr><td>7.</td><td>If any continuing student is also admitted to a minor programme, he/she has to pay a fee of Rs. 32,000/- for AY 2025-26 in addition to fees for the semesters / summer terms enrolled in. The fee is payable in two installments – Rs. 16,000/- at the time of admission as minor application</td></tr>
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	fee and Rs. 16,000/- on completion of requirements as minor certificate fee. Admission fees for minor programme will be revised in subsequent years as per Institute norms.
8.	If there are dues outstanding from a student, his grades will be withheld.
9.	Students who accumulate mess arrears would be required to pay a prescribed additional advance at the time of next registration.
10.	For some specific programmes requiring special treatment, fees and mode of their payment will be determined by the Vice-Chancellor in consultation with the Chancellor.

Programme	Pilani Campus	K K Birla Goa Campus	Hyderabad Campus	Dubai Campus*
B.E. Chemical	✓	✓	✓	✓
B.E. Civil	✓		✓	✓
B.E. Electrical & Electronics	✓	✓	✓	✓
B.E. Mechanical	✓	✓	✓	✓
B.E. Computer Science	✓	✓	✓	✓
B.E. Electronics and Instrumentation	✓	✓	✓	✓
B.E. Biotechnology				✓
B.E. Electronics & Communication	✓	✓	✓	✓
B.E. Manufacturing Engg.	✓			
B.E. Mathematics and Computing	✓	✓	✓	✓
B.E. Electronics and Computer Engg.		✓		✓
B.E. Architectural & Urban Engineering				✓

B.E. Biotechnology with specialization in Applied Molecular Biology				✓
B.E. Chemical with specialization in Energy, Environment & Sustainability				✓
B.E. Mechanical with specialization in Aerospace				✓
B.E. Environmental and Sustainability Engg.	✓	✓	✓	
B. Pharm.	✓		✓	
M.Sc. Biological Sciences	✓	✓	✓	
M.Sc. Chemistry	✓	✓	✓	
M.Sc. Economics	✓	✓	✓	
M.Sc. Mathematics	✓	✓	✓	
M.Sc. Physics	✓	✓	✓	
M.Sc. General Studies	✓			
M.Sc. Physics with specialization in Space Science & Technology				✓
M.Sc. Semiconductor and Nanoscience	✓	✓	✓	