



iitmadrass

ENGINEERING PHYSICS

INDIAN INSTITUTE OF TECHNOLOGY, MADRAS

PLACEMENTS BROCHURE

ABOUT THE PROGRAM

The Bachelor of Technology in Engineering Physics is a program offered jointly by the Department of Physics and Department of Electrical Engineering at IIT Madras. The program is designed to produce Engineering Physicists equipped with a strategic combination of Physics, Electrical Engineering and Mathematics courses. In addition to being ready for a career in Electrical Engineering, the students are equipped with tools from Physics, such as Quantum Physics, Optics and Nanotechnology, enabling them to be pioneers of the future in technology. The amalgamation of Engineering and Theoretical Science imparts Engineering Physicists with superior mathematical, analytical and abstract-thinking abilities. Elevated by advanced problem solving and instrumentation skills, Engineering Physicists are ideal for solving interdisciplinary global challenges.

CURRICULUM AT A GLANCE

BASIC ENGINEERING COURSES

These include fundamental courses in **MATHS, PHYSICS, CHEMISTRY, BIOLOGY** and **ENGINEERING DRAWING** that are compulsory for all programs

CORE ENGINEERING COURSES

These include fundamental courses in the home departments of **PHYSICS** and **ELECTRICAL ENGINEERING**

These courses are **mandatory**

MATHEMATICS COURSES

PROFESSIONAL ELECTIVES

These are **PHY** or **EE** courses chosen by the students

FREE ELECTIVES

These are courses chosen by the students from **ANY DEPARTMENT**

THE PHYSICS CURRICULUM

The B.Tech in Engineering Physics program seamlessly integrates Theoretical Physics courses with Experimental Labs to produce Physicists who are prepared to tackle the world's pressing research problems. The dynamic curriculum allows students to specialize in advanced areas such as Condensed Matter Physics, High Energy and Particle Physics, Quantum Optics, Cosmology, BioPhysics, Non Linear Dynamics and Quantum Computing.

With leading technologies of the world such as Deep Learning, AI and Financial Quantitative Analytics looking to Physics to provide the theory and hardware to power and enable these technologies - Engineering Physicists are at the forefront of developing cutting edge technology.

CORE PHYSICS CURRICULUM

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| STATISTICAL THERMODYNAMICS | QUANTUM MECHANICS |
| INTRODUCTORY MATHEMATICAL PHYSICS | STATISTICAL PHYSICS |
| CLASSICAL DYNAMICS | SOLID STATE PHYSICS |
| EP LABS I, II, III, IV (PHYSICS LABS) | METHODS OF SPECTROSCOPY |
| | EP LABS I, II, III, IV (PHYSICS LABS) |

IMPORTANT ELECTIVES

**CONDENSED MATTER
PHYSICS**

**ADVANCED PARTICLE
PHYSICS**

DYNAMICAL SYSTEMS

QUANTUM MECHANICS

QUANTUM OPTICS

**QUANTUM COMPUTING
AND QUANTUM
INFORMATION**

**TECHNOLOGY OF THIN
FILMS**

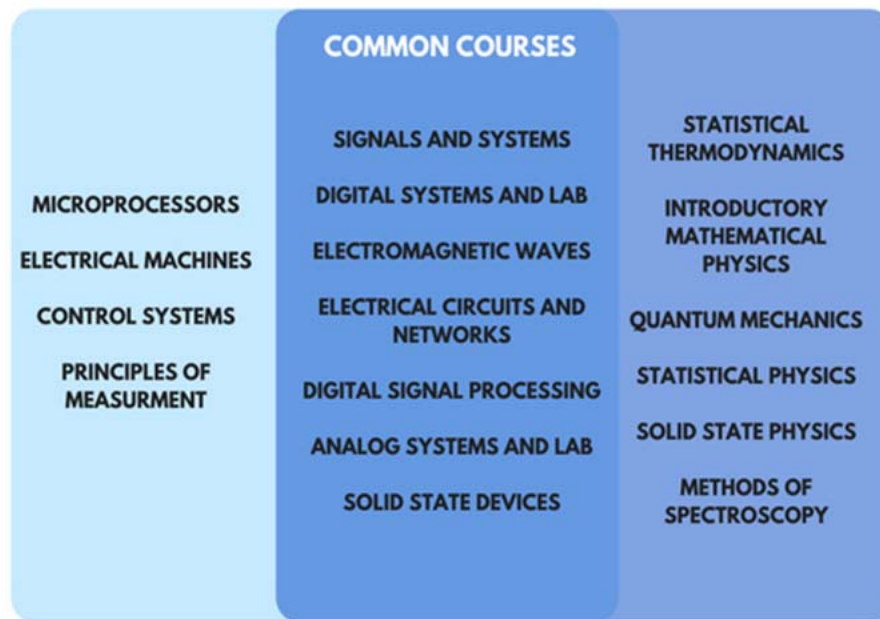
**LASER PHYSICS AND
APPLICATIONS**

ENGINEERING OPTICS

ELECTRICAL ENGINEERING IN ENGINEERING PHYSICS

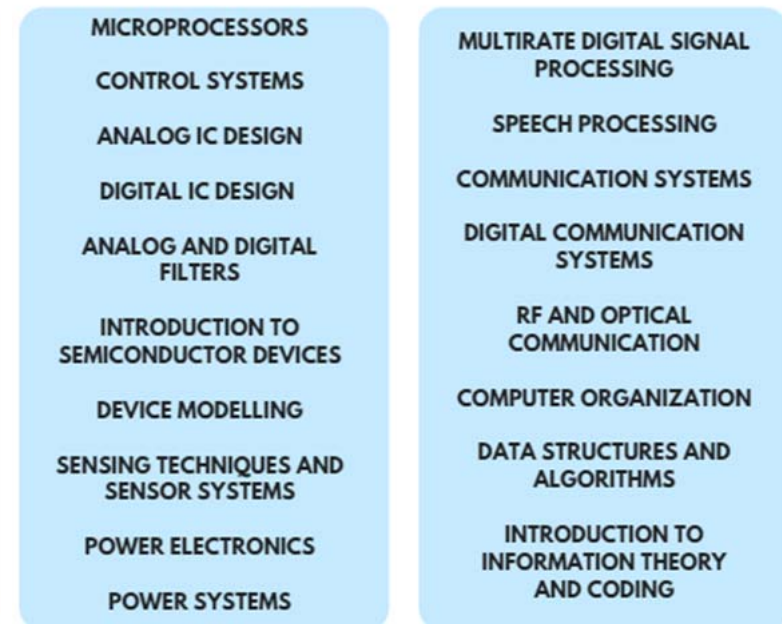
With a core curriculum that is heavily oriented to Electrical Engineering, the B.Tech in Engineering Physics program can easily be moulded to prepare students for a career in Electrical Engineering. The baseline curriculum provides students with a foundation in Analog and Digital Systems, Signal Processing and Semiconductor technologies. Beyond this, the flexible curriculum allows students to pursue specializations and advanced studies in various domains of Electrical Engineering. A strong background in Electrical Engineering integrated with an in-depth knowledge of the underlying Physics, Engineering Physicists are ideal for leading edge Electrical Engineering roles.

THE CORE CURRICULUM AT A GLANCE



 ELECTRICAL ENGINEERING  ENGINEERING PHYSICS

IMPORTANT ELECTIVES



MATHEMATICS AND COMPUTER SCIENCE IN ENGINEERING PHYSICS

To prepare engineers for the world's growing multidisciplinary challenges, IIT Madras has moved from a rigid curriculum to a dynamic curriculum that allows students to specialize in areas relevant to their fields of interest. The Engineering Physics program in specific allows students to choose over 25% of their coursework, enabling them to design a curriculum tailor-made to their career needs.

MATHEMATICS IN THE CORE CURRICULUM

INTRODUCTION TO MATHEMATICAL
PHYSICS

VARIATIONAL CALCULUS (as a part
of Classical Dynamics)

ELECTIVES

ADVANCED MATHEMATICAL PHYSICS

ORDINARY AND PARTIAL DIFFERENTIAL
EQUATIONS

PROBABILITY AND STOCHASTIC
PROCESS

APPLIED LINEAR ALGEBRA

GRAPH THEORY COMPLEX ANALYSIS

Theoretical Physics is intrinsically laden with advanced Mathematics. Apart from the core course requirements, students often take advanced mathematics courses as electives.

COMPUTER SCIENCE IN PHYSICS

METHODS OF COMPUTATIONAL
PHYSICS
(in C, Python and Mathematica)

NUMERICAL METHODS AND
PROGRAMMING

ELECTIVES

COMPLEX NETWORK ANALYSIS

DATA STRUCTURES AND ALGORITHMS

COMPUTER ORGANIZATION

MACHINE LEARNING

APPLIED CRYPTOGRAPHY

SECURE SYSTEMS PROGRAMMING

From in-depth computational analysis in Particle Physics to low level machine language in embedded systems, Computer Science is an integral part of Engineering Physics.

ENGINEERING PHYSICS in NON – CORE FIELDS

DATA SCIENCE, ML AND DEEP LEARNING

DATA SCIENCE FINDS A HOST OF APPLICATIONS IN ANALYZING AND DERIVING CORRELATIONS FROM EXPERIMENTAL DATA , PARTICULARLY IN THE FIELD OF EXPERIMENTAL PARTICLE PHYSICS

ANALYTICAL MODELLING TECHNIQUES FROM STATISTICAL PHYSICS AND QUANTUM INFORMATION ARE SUPPLEMENTED BY A STRONG MATHEMATICAL BACKGROUND IN MULTIVARIABLE CALCULUS , STATISTICS AND LINEAR ALGEBRA. STUDENTS HAVE A SOUND FOUNDATION TO FLOURISH AS DATA SCIENTISTS

CONSULTANCY

AN INTERDISCIPLINARY BACKGROUND EQUIPS STUDENTS WITH A DOMAIN KNOWLEDGE THAT TRANSCENDS BOUNDARIES.

AN ELECTRICAL ENGINEERING BACKGROUND ALLOWS ENGINEERING PHYSICISTS TO SERVE HIGH-TECH INDUSTRIES SUCH AS THE TELECOM INDUSTRY.

A STRONG BACKGROUND IN PURE PHYSICS ENABLES STUDENTS TO MAKE CREDIBLE SCIENTIFIC ASSESSMENTS REGARDING FUTURE TECHNOLOGY.

BESIDES THIS, A BRIEF INTRODUCTION TO LIFE SCIENCES COUPLED WITH AN ENGINEERING BACKGROUND ENABLES THE STUDENTS TO EFFECTIVELY PROVIDE SOLUTIONS IN BIOENGINEERING DOMAINS AS WELL.

FINANCE

ELECTIVES

DYNAMICAL SYSTEMS

Non Linear Dynamics and Chaos studies with applications in Market Analysis and Economic Growth

PRINCIPLES OF ECONOMICS

ACCOUNTING AND FINANCE FOR ENGINEERS

OPERATIONS RESEARCH

INTELLECTUAL PROPERTY

PHYSICS CONCEPTS FROM DYNAMICAL SYSTEMS SUCH AS SCALING, FRACTALS AND DETERMINISTIC CHAOTIC SYSTEMS ARE USEFUL TO ANALYSE FINANCIAL TIME SERIES AND DEVELOP QUANTITATIVE MODELS FOR OPTION PRICING, PORTFOLIO MANAGEMENT AND RISK MEASUREMENT

PLACEMENTS & INTERNSHIPS

PREVIOUS INTERNSHIPS



PREVIOUS PLACEMENTS



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