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M.Tech.
EMBEDDED SYSTEMS

BITS Pilani
Pilani | Dubai | Goa | Hyderabad | Mumbai

WORK INTEGRATED
LEARNING PROGRAMMES

HCLTech

WHO SHOULD APPLY?

M.Tech. Embedded Systems is a four-semester Work Integrated Learning Programme designed for engineers working in the embedded systems industry (automotive, avionics, consumer electronics, medical devices, defense, and processor design) who want to gain knowledge in state-of-the-art tools and theories.

The core topics span embedded control, real-time systems, model-based design and verification, Processor Architecture, Chip Design and implementation of embedded systems.

▶ Highly driven and ambitious engineers working for Embedded Systems services or product companies and wish to advance their careers in hyper-growth areas such as Consumer Electronics, Automotive, Semiconductors, Medical Equipment, and Process industries

▶ Professionals in technical areas such as Software Development & Testing (System or Applications), Hardware Design & Validation, Product Design, Tech Support, Communications, and Network Engineering

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WHAT ARE THE MAIN HIGHLIGHTS OF THE PROGRAMME?

▶ Learn without a career break with online classes conducted mostly on weekends or after business hours.

▶ The programme offers a set of courses that allow learners to gain and apply knowledge of various Embedded Systems, and design fault-tolerant, Safety-Critical systems for real-time processing

▶ Participants will be able to use Remote Labs, that provide remote access to hardware and software tools that are used for designing and testing embedded systems on various platforms such as MultiCore STM32, Raspberry Pi, Arduino, Xilinx FPGA.

▶ The programme makes use of VLSI Architecture tools, Simulation tools, and Mathematical Modelling tools. These include GEM5, Tossim, Cheddar, Keil, CCS Studio, and MATLAB

▶ Semesters 1st, 2nd, and 3rd cover four courses each. The 4th semester covers Dissertation/ Project Work.

▶ The Dissertation (Project Work) in the final semester enables students to apply concepts and techniques learnt during the programme.

▶ The programme uses a Continuous Evaluation System that assesses the learners over convenient and regular intervals. Such a system provides timely and frequent feedback and helps busy working professionals stay on course with the programme.

▶ The education delivery methodology is a blend of classroom and experiential learning. Experiential learning consists of lab exercises, assignments, case studies, and work-integrated activities

▶ Participants who successfully complete the programme will become members of an elite & global community of BITS Pilani Alumni

▶ **Learning Continuity Assurance facility, that allows participants to take a break without losing the semester fee paid by them.**

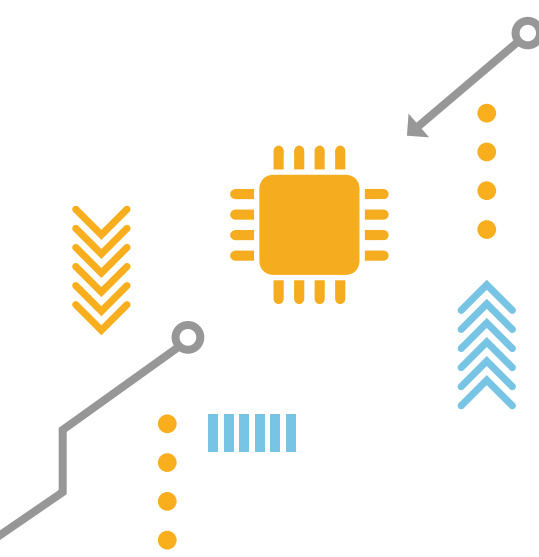▶ **Option to submit fee using easy-EMI with 0% interest. Enroll with only INR 7,428 in the first month.**

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Classes are conducted by a pool of faculty members comprising of academicians from BITS Pilani, and guest faculty who are experienced industry professionals.

WHAT ARE THE PROGRAMME OBJECTIVES?

Studies have shown that senior positions in technology industry require holistic understanding and capabilities that span multiple technologies, critical thinking, and problem solving situations and cross-functional collaboration. The programme aims to:

▶ Build and nurture the knowledge, skills, and aptitude required to realise long-term career growth and enables participants to undertake higher responsibilities at the workplace

▶ Provide a requisite conceptual foundation, and contextual understanding of real-world applications that enable a learner to enhance workplace performance and stand out among peers for growth opportunities

▶ Enable the learners to choose to gain expertise in some of the fastest growing domains like IoT, Instrumentation, Automotive Engineering, Aeronautics, Telecommunication and Defense

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WHAT ARE THE STUDENT LEARNING OUTCOMES?

The program aims to create Embedded Designers who will be able to:

- ▶ Design, describe, validate, and optimize embedded electronic systems in different industrial application areas

- ▶ Define hardware and software communication and control requirements and be able to effectively bridge the gap between hardware and software design in different industrial production contexts

- ▶ To use tools for the development and debugging on a variety of platform

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WHAT IS THE EDUCATION DELIVERY METHODOLOGY?

ATTEND ONLINE LECTURES OVER WEEKENDS

▶ Lectures are conducted live via online classes. These lectures can be attended via the internet using a computer from any location. These online classrooms offer similar levels of interactivity as regular classrooms at the BITS Pilani campus.

▶ Classes for students admitted during the period May-June 2020 will begin in July 2020. The class schedule is announced within 1 week of completion of the admission process.

▶ The online lectures are conducted usually over weekends for a total of 7-8 hours per week. If you miss a lecture, you can also access the recorded lecture on the internet.

DIGITAL LEARNING

Learners can access engaging learning material at their own pace which includes recorded lectures from BITS Pilani faculty members, course handouts and recorded lab content where applicable

CONTINUOUS ASSESSMENT

Continuous Assessment includes graded Assignments/ Quizzes, Mid-semester exam, and Comprehensive Exam

EXPERIENTIAL LEARNING

The programme emphasises on Experiential Learning that allows learners to apply concepts learnt in the classroom in simulated, and real work situations. This is achieved through:

i. Virtual & Remote Labs: The remote labs provide you with remote access to hardware and software tools that are used for designing and testing embedded systems on various platforms such as MultiCore STM32, Raspberry Pi, Arduino, Xilinx FPGA

ii. Simulation-based Lab components: Some or all of the following would be utilised across the programmeo
   - VLSI Architecture tools like GEM5
   - Simulation tools like Tossim, Cheddar, Keil, CCS Studio
   - Mathematical Modelling tools such as MATLAB

Case Studies and Assignments: Carefully chosen real-world cases & assignments are both discussed and used as problem-solving exercises during the programme

Dissertation/ Project Work: The fourth semester offers an opportunity for learners to apply their knowledge gained during the programme to a real-world like complex project. The learner is expected to demonstrate an understanding of vital principles learnt across semesters and their ability to successfully apply these concepts

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What is the Eligibility Criteria?

The minimum eligibility to apply: Employed professionals holding Bachelor of Engineering in EEE/ECE/ENI/Computer Science or equivalent with at least 60% aggregate marks and minimum one year of work experience in relevant domains.

FEE STRUCTURE

The following fees schedule is applicable for candidates seeking new admission during the academic year 2024-25.

Application Fees (one time)	:INR 1,500
Admission Fees (one time)	:INR 16,500
Semester Fees (per semester)	:INR 55,000

Admissions are open now. Last date to apply is Monday, 13th January 2025.

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0% EASY-EMI OPTION

Instant EMI option with 0% interest is now available that allows you to pay programme fee in an easy and convenient way.

- Instant online approval in seconds
- No Credit Cards/ CIBIL score required
- Easy & Secure online process using Aadhaar and PAN number
- Anyone with a Salary Account with Netbanking can apply
- Special interest rate for BITS Pilani WILP applicants
- Pay fee in easy installments of INR 12,870 p.m. for the First Semester, and only INR 8,800 p.m. for subsequent Semesters

Click here to learn more about easy-EMI option with 0% interest

LEARNING CONTINUITY ASSURANCE

For students taking new admission in First Semester 2020, Institution will offer a Learning Continuity Assurance facility. This is meant for students who face an unresolvable professional or medical situation during the semester 1 & 2 of their respective programme and wish to take a break during the semester and also register again in the same semester in future. Learning continuity Assurance will enable such student to take a break without losing the semester fee paid by them during Semester 1 and Semester 2 of their respective programme. To take a break and avail the benefit of Learning Continuity Assurance facility, the student will need to submit an application to the institution along with documentary proof to support the reason for taking the break. The authorised officer of the institution will decide if the reason for break in the

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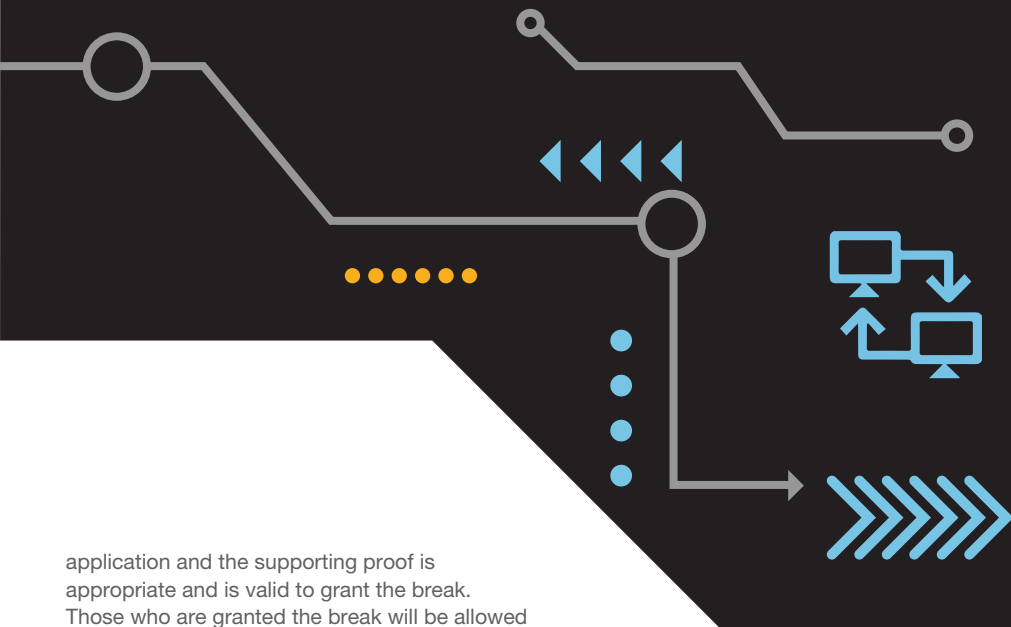
application and the supporting proof is appropriate and is valid to grant the break. Those who are granted the break will be allowed to register in the semester again when it is offered in the future. Registering in the semester again after break is subject to availability of the programme and semester schedules prevailing at the time of registration. The decision to grant the break with Learning Continuity assurance will rest

with the authorised officer of the institution. The facility to allow a break is also available in subsequent semesters (Semester 3 onwards), but in this case a student would need to pay the semester fee again to register and continue in the semester.
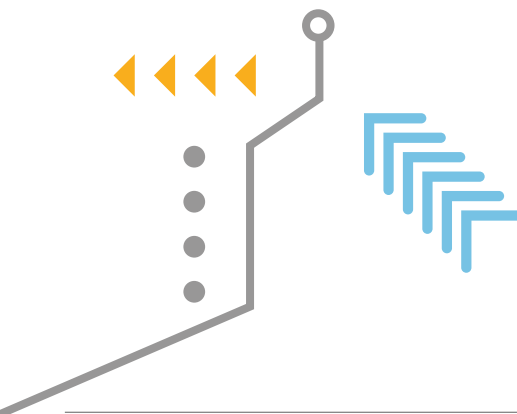
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Programme Curriculum

Participants need to take at least 12 courses towards coursework, and complete one Project/ Dissertation. The coursework requirement for the programme would consist of a set of core courses and electives. Core courses are compulsory for all participants, while electives can be chosen based on individual learning preferences.

First Semester

- Embedded System Design
- Real Time Systems
- Software for Embedded System
- Elective 1

Second Semester

- Hardware Software Co-Design
- Elective 2
- Elective 3
- Elective 4

Third Semester

- Elective 5
- Elective 6
- Elective 7
- Elective 8

Fourth Semester

- Dissertation

Electives

- Computer Networks
- Network Security
- Wireless & Mobile Communication
- Project Management
- Real-Time Operating Systems
- Avionics Systems
- Pervasive Computing
- Reconfigurable Computing
- DSP Based Control of Electric Drives
- Digital Signal Processing
- Advanced Control Systems
- Fault-Tolerant System Design
- VLSI Architecture
- Networked Embedded Applications
- Advanced digital signal processing
- VLSI Design
- Testability for VLSI
- Advanced Computer networks
- Optical Communication

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Choice of Electives is made available to enrolled students at the beginning of each semester. A limited selection of Electives will be offered at the discretion of the Institute.

HOW TO APPLY

▶ Click here to visit the BITS Pilani Online Application Center. Create your login at the Application Center by entering your unique Email id and create a password of your choice. Once your login has been created, you can anytime access the online Application Center using your email id and password.

▶ Once your login has been created, you can anytime access the online Application Center using your email ID and password. Once you have logged in, you will see a screen showing 4 essential steps to be completed to apply for the programme of your choice

▶ Begin by clicking on Step 1 - 'Fill/ Edit and Submit Application Form'. This will enable you to select the programme of your choice. After you have chosen your programme, you will be asked to fill your details in an online form. You must fill all details and press 'Submit' button given at the bottom of the form

▶ Take the next step by clicking on Step 2 - 'Download Application PDF Copy'. This will download a pdf copy of the application form on your computer

▶ Now, click on Step 3 - 'Pay Application Fee' to pay INR 1,500/- using Net banking/ Debit Card/ Credit Card

▶ Take a printout of the downloaded Application Form and note down the Application Form Number that appear on the top-right corner of the first page. This Application Form Number should be referred in all future correspondence with BITS Pilani

▶ In the printout of the downloaded Application Form, you will notice on page no. 3 a section called the Employer Consent Form. Complete the Employer Consent Form. This form needs to be signed and stamped by your organisation's HR or any other authorised signatory of the company

Important: In view of work-from-home policies mandated by many organisations, a few candidates may not be able to get the physical forms signed by their HR/ other authorised organisational representative. Such candidates may instead request an email approval to be sent to their official email ID by the HR using the format available through this link.

Admissions are open now.
Last date to apply is
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▶ Further on page no. 4 of the printed Application Form is a section called the Mentor Consent Form. The Mentor Consent Form needs to be signed by the Mentor.

Important: In view of work-from-home policies mandated by many organisations, a few candidates may not be able to get the physical forms signed by their Mentor. Such candidates may instead request an email approval to be sent to their official email ID by the Mentor using the <u>format available through this link.</u>

WHO IS A MENTOR:

Candidates applying to Work Integrated Learning Programmes must choose a Mentor, who will monitor the academic progress of the candidate, and act as an advisor & coach for successful completion of the programme.

Candidates should ideally choose the immediate supervisor or another senior person from the same organisation. In case a suitable mentor is not available in the same organisation, a candidate could approach a senior person in another organisation who has the required qualifications. Wherever the proposed Mentor is not from the same employing organization as that of the candidate, a supporting document giving justification for the same should be provided by the candidate's employer.

Candidates applying to B.Tech. programmes should choose a Mentor who is an employed professional with B.E./ B.S./ B.Tech./ M.Sc./ A.M.I.E./ Integrated First Degree of BITS or equivalent. Candidates applying to M.Tech., M.Sc., MBA, M.Phil programme should choose a Mentor who is an employed professional with:

a. B.E./ M.Sc./ M.B.A./ M.C.A./ M.B.B.S. etc. and with a minimum of five years of relevant work experience
   OR
b. M.E./ M.S./ M.Tech./ M.Phil./ M.D./ Higher Degree of BITS or equivalent
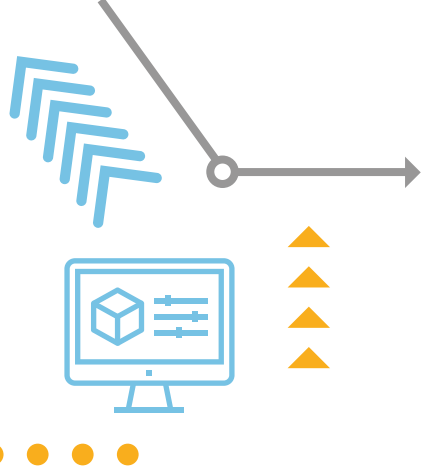
▶ Further on page no. 5 of the downloaded Application Form, is a Checklist of Enclosures/ Attachments.

  a. Make photocopies of the documents mentioned in this Checklist

  b. Applicants are required to self-attest all academic mark sheets and certificates

▶ Finally, click on Step 4 - 'Upload & Submit All Required Documents'. This will allow you to upload one-by-one the printed Application Form, Mentor Consent Form, Employer Consent Form, and all mandatory supporting documents and complete the application process. Acceptable file formats for uploading these documents are .DOC, .DOCX, .PDF, .ZIP and .JPEG.

▶ Upon receipt of your Application Form and all other enclosures, the Admissions Cell will scrutinise them for completeness, accuracy and eligibility.

▶ Admission Cell will intimate selected candidates by email within two weeks of submission of application with all supporting documents. The selection status can also be checked by logging in to the Online Application Centre.

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D ISCLAIMER

Ever since it was declared as a Deemed to be University in 1964, BITS Pilani has been offering higher education programmes in science and technology, and has earned an enviable reputation for its innovations in this sphere. The Work Integrated Learning Programmes (WILP) of BITS Pilani constitutes a unique set of educational offerings for working professionals. These programmes, which BITS began to offer in 1979, have, over the years, evolved along the lines envisaged in the National Policy on Education, 1986.

The WILP are rigorous higher education programmes in technology areas, designed keeping the evolving needs of industry in view, and meant for working professionals in their respective domains. The very intent is to deliver the education at the workplace, in order that the greatest degree of work integration of the education is achieved, and thus the WILP are very distinct in philosophy and pedagogy from open, distance learning programmes. Though it is incorrect and improper, at times the WILP are compared to ODL programmes. Accordingly, it has been our constant endeavor to engage with the regulator, and provide all necessary information about these programmes.

The WILP have been well received, and accepted by industry, because of the high quality of the programmes in terms of the curriculum and the instruction, and also because of the high degree of work integration, which results not only in up gradation of knowledge, but also in up skilling, and productivity increase.

M.Tech. Embedded Systems