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M.Tech.

SOFTWARE ENGINEERING

Work Integrated
Learning Programmes



BITS Pilani
Pilani | Dubai | Goa | Hyderabad



Career progression in the software industry calls for learning a full stack of multiple technologies, acquiring an ability to architect high impact solutions, envision & design great new products, solve complex problems and manage cross functional collaborations. It also entails having an understanding of several new digital technologies to integrate capabilities and features that deliver the best value to users and customers.

M.Tech in Software Engineering from BITS Pilani is a unique work integrated learning programme for working professionals that

covers a full stack of technologies and competencies required to accelerate in the software industry today. A comprehensive curriculum, extensive emphasis on experiential learning using remote labs and cloud labs and a flexible education methodology that enables working professionals to acquire a prestigious post graduate engineering degree while pursuing their careers, the M.Tech Software Engineering is just the right programme for career growth in the software industry.



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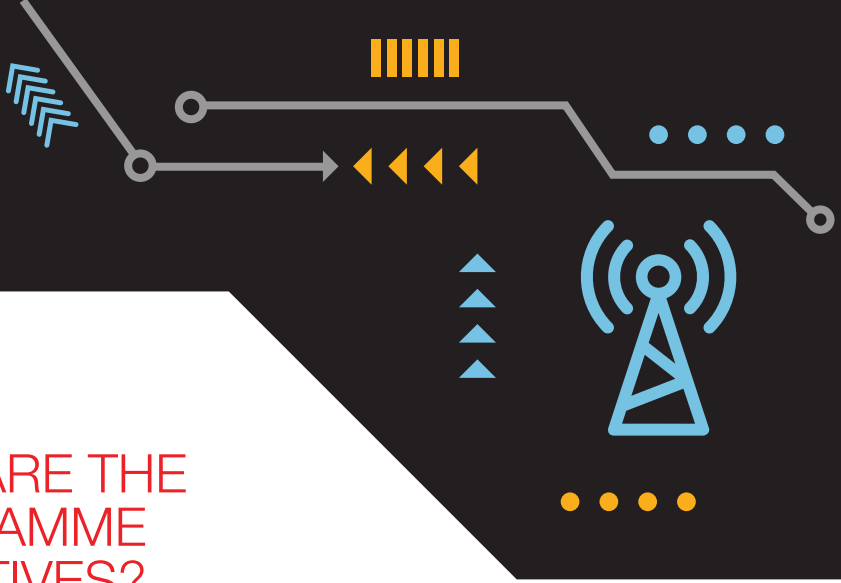


What are the Highlights of the Programme?

- ▶ The programme is of four semesters, with online classes conducted mostly on weekends or after-business hours.
- ▶ Extensive use of Cloud-based virtual labs and Remote labs to give hands-on access to tools and platforms such as Jenkins, Docker, GitHub, SonarQube, Selenium, Tomcat, Maven, Open Project, Gantt Project and WireShark, Java, Python, Prolog, Lisp, Selenium Web driver, Python Ecosystem – NumPy, SciPy, Pandas, scikit-learn, Matplotlib; Searborn, Keras, NLTK, SQLite and pgmpy, Eclipse, Weka, Microsoft Power BI, TensorFlow, Tableau and Anaconda Navigator, EdgecloudSim and IoTsimEdge, Apache Hadoop, Apache Storm, Apache Spark, Apache Kafka, MongoDB, CockroachDB and MPI
- ▶ 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.
- ▶ **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 & 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.



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WHAT ARE THE STUDENT LEARNING OUTCOMES?

Upon successful completion of the program, participants will have developed:

- ▶ An ability to apply contemporary software architectural and design principles for implementation of software systems
- ▶ An ability to design, develop, test and deploy software by applying appropriate tools and techniques for automation and continuous integration and delivery
- ▶ An ability to build robust, maintainable and scalable systems that will exhibit relevant software architecture quality attributes
- ▶ An ability to plan and manage a software product lifecycle through the use of various planning, development, management and monitoring tools



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LEARNING 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 emphasizes on Experiential Learning that allows learners to apply concepts learnt in the classroom in simulated, and real work situations. This is achieved through 3 lab setups. Apart from these, AWS is also extensively used for experiments on Scalable Services.



Cloud based virtual lab hosts Dev-Ops tool chain, languages and programming platforms for Full Stack engineering and other simulators:

- o Tools : Jenkins, Docker, GitHub, SonarQube, Selenium, Tomcat, Maven, Open Project, Gantt Project and WireShark
- o Languages and Library: Java, Python, Prolog, Lisp, Selenium Web driver, Python Ecosystem – NumPy, SciPy, Pandas, scikit-learn, Matplotlib; Searborn, Keras, NLTK, SQLite and pgmpy
- o Programming Platforms: Eclipse, Weka, Microsoft Power BI, TensorFlow, Tableau and Anaconda Navigator
- o Simulators: EdgecloudSim and IoTSimEdge



Remote Lab facility caters to the needs of resource intensive requirements of Big Data Analytics applications with the following platforms:

- o Apache Hadoop
- o Apache Storm
- o Apache Spark
- o Apache Kafka
- o MongoDB,
- o CockroachDB
- o MPI



Remote Lab facility caters to the needs of Embedded Systems and supports the following:

- o Hardware / Software tools: MultiCore STM32 microcontroller based development boards.
- o Simulation tools: Tossim, Cheddar and Keil.

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WHAT IS THE ELIGIBILITY CRITERIA?

Minimum eligibility to apply: Employed professionals holding B Tech., BE, M.Sc, MCA or equivalent in relevant disciplines 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 2020-21:

Application Fees (one time) :INR 1,500

Admission Fees (one time) :INR 16,500

Semester Fees (per semester) :INR 55,000

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

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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 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

The programme offers specializations in high-demand areas such as Data Analytics, Internet of Things, Embedded Systems, Security, Networks and Cloud.

Electives can be chosen either from the General pool of electives or from across other pools of electives for specializations. Specializations are optional. To earn a specialization, a participant must select and successfully complete at least 5 courses from that specialization pool.

First Semester

- Software Architectures
- Cloud Computing
- Agile Software Processes
- Elective 1

Second Semester

- Software Product Management
- Software Testing Methodologies
- Elective 2
- Elective 3

Third Semester

- Elective 4
- Elective 5
- Elective 6
- Elective 7

Fourth Semester

- Dissertation

Electives

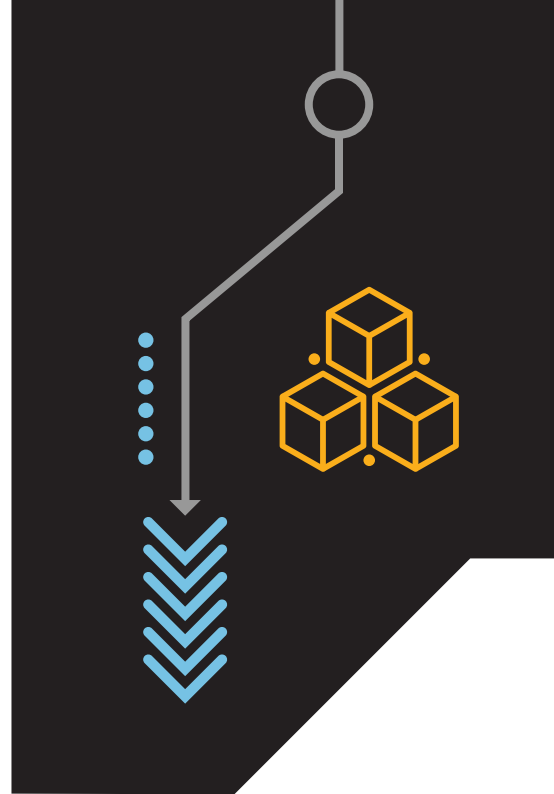
- Data Visualization
- Data Mining
- Artificial Intelligence
- Object Oriented Analysis and Design
- Introduction to DevOps
- Data Warehousing
- Embedded System Design
- Database Design & Applications
- Data Structures & Algorithm Design
- Big Data Systems
- Cyber Physical Systems
- Service Oriented Computing
- Usability Engineering
- Secure Software Engineer
- Applied Machine Learning
- Blockchain Technologies & Systems
- Scalable Services
- Cross Platform Application Development
- Edge Computing
- Open Source Software Engineering
- Middleware Technologies
- Software Project Management
- Hardware Software Co-Design
- Software Quality Management
- Cyber Security

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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



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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](#).

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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 [format available through this link.](#)

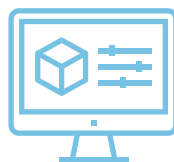
WHO IS A MENTOR:

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.

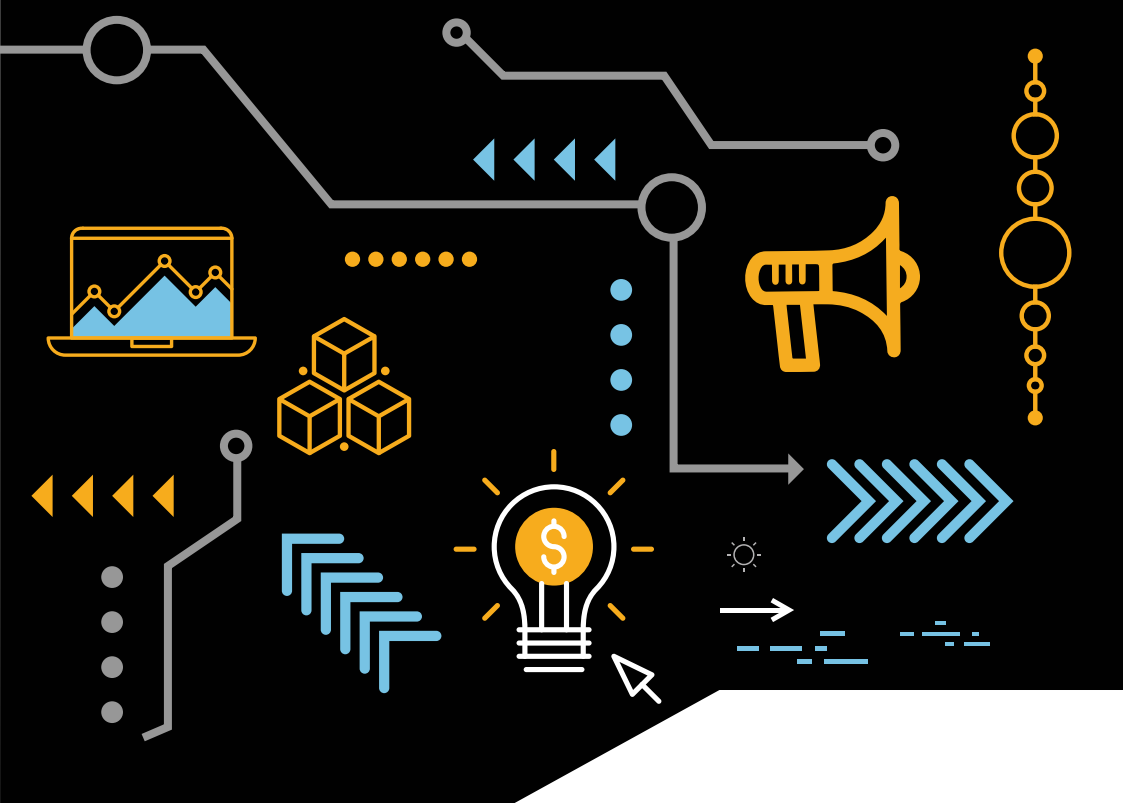
Candidates applying to B.Tech. programmes should choose a Mentor who is an employed professional with B.E./ B.S./ B.Tech./ M.Sc./ A.M.I.E./ Integrated First Degree of BITS or equivalent. Candidates applying to M.Tech., M.Sc., MBA, M.Phil programme should choose a Mentor who is an employed professional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

- 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
- 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.
 - Make photocopies of the documents mentioned in this Checklist
 - 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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DISCLAIMER

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.

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