



M.Tech.

# SOFTWARE ENGINEERING



**BITS Pilani**  
Pilani | Dubai | Goa | Hyderabad

Work Integrated Learning Programmes






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.

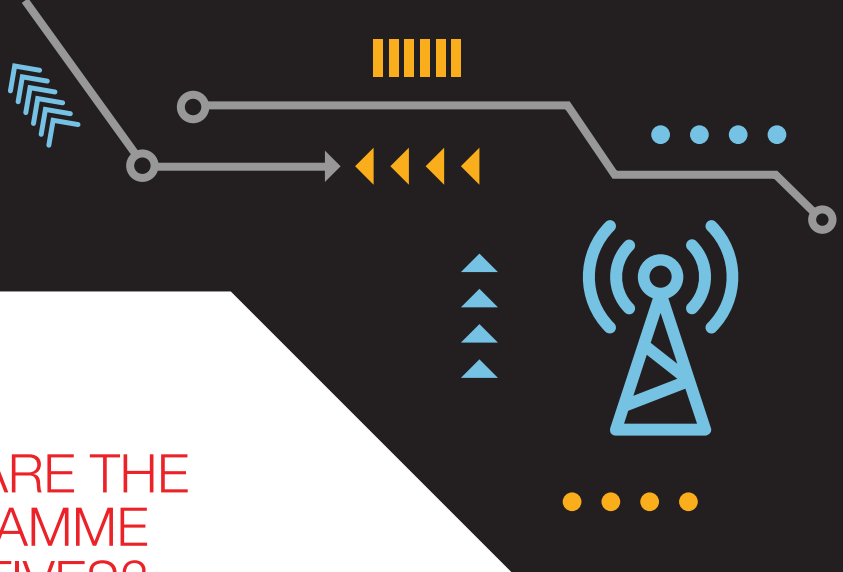




## What are the Highlights of the Programme?

- ▶ It's a four-semester online programme 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.
- ▶ The dissertation or project work in the final semester allows students to apply concepts and techniques learned during the programme to real-world situations.
- ▶ The programme entails a Continuous Evaluation System that assesses the learners, over convenient and regular intervals. Such a system provides timely and frequent feedbacks and helps busy working professionals to stay on track 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 the prestigious global community of BITS Pilani Alumni.

*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.





## 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



# 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.

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.



# 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 two years of work experience within HCL in relevant domains.

# FEE STRUCTURE

The following fees schedule is applicable for candidates seeking new admission during the academic year 2021-22:

Application Fees (one time)	:INR 1,500
Admission Fees (one time)	:INR 16,500
Semester Fees (per semester)	:INR 57,750

# Programme Curriculum

## 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

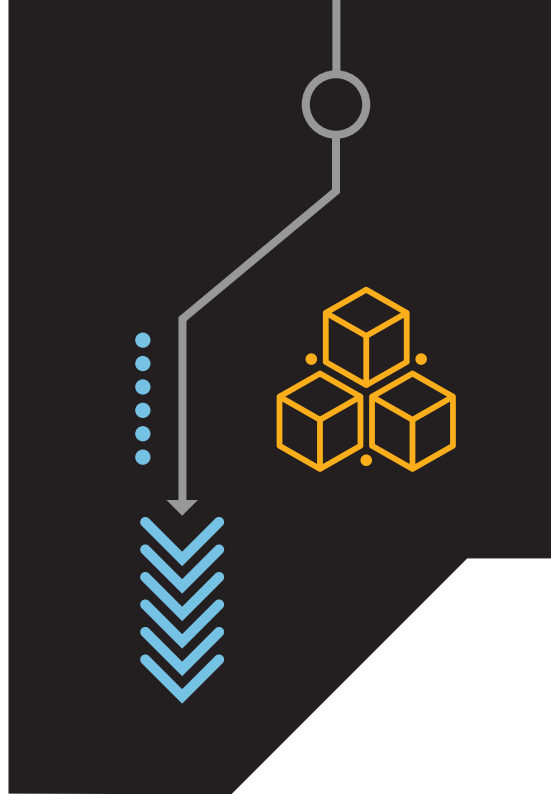
- Data Visualization
- Data Mining
- Artificial Intelligence
- Object Oriented Analysis and Design
- Introduction to DevOps
- Data Warehousing
- Embedded System Design

- 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



# HOW TO APPLY

- ▶ Create your login at the Online Application Center by entering your official HCL Email ID only and create a password of your choice. Once your login has been created, you can anytime access the Online Application Center using your official email ID and password
- ▶ 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
- ▶ Now, click on 'Pay Application Fee' to pay INR 1,500/- using Netbanking/ Debit Card/ Credit Card
- ▶ Finally, click on 'Upload & Submit All Required Documents'. This will allow you to upload one-by-one all the mandatory supporting documents such academic certificates and transcripts, photograph, etc. 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





## 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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