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# M.Tech.

## Artificial Intelligence & Machine Learning
## For Working Professionals

**WORK
INTEGRATED
LEARNING
PROGRAMMES**

BITS Pilani
Pilani | Dubai | Goa | Hyderabad | Mumbai
An Institution of Eminence

HCL

# PROGRAM INTRODUCTION

With a surge of job opportunities in the fields of Artificial intelligence and Machine Learning, the world is indeed standing on the threshold of massive transformation.

According to the World Economic Forum's Future of Jobs Report, 85 million jobs will be replaced by machines with AI by 2025. While that might make you uneasy, the same report states that 97 million new jobs will be created by 2025 due to AI. Are you prepared?

Prepare for a career with infinite possibilities in AI and ML with India's most comprehensive and world-class M.Tech. Artificial Intelligence and Machine Learning programme without taking any career break.

This four-semester programme covers a wide variety of skills and knowledge areas, and enables IT professionals and Software developers to build a skill set that enables career elevation in some of the most sought-after job roles such as ML Engineers and AI Scientists, etc.

Humanities

Design

Computers

Mathematics

Computing
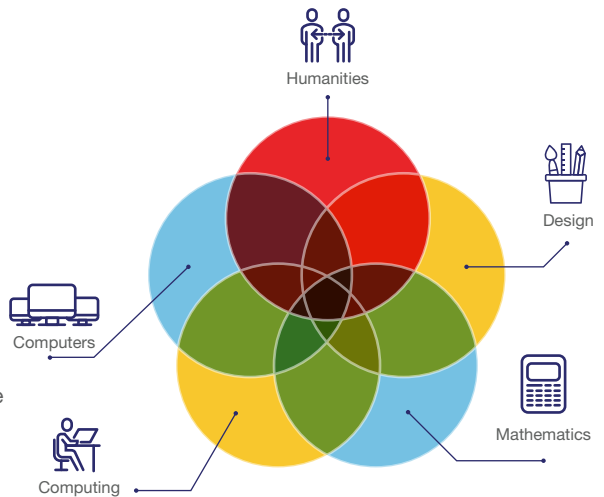
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# PROGRAMME HIGHLIGHTS

- M.Tech. Artificial Intelligence and Machine Learning is a BITS Pilani Work Integrated Learning Programme (WILP). BITS Pilani Work Integrated Learning Programmes are UGC approved.

- The programme is of four semesters, with online classes conducted mostly on weekends or after business hours. You can pursue the programme without any career break.

- Offers the most comprehensive AI & ML Curriculum for working professionals.

- The programme has an unmatched range & depth, and covers the widest variety of skill & knowledge areas required to develop advanced AI solutions.

- Meant for IT professionals and Software developers aiming to become expert Machine Learning Engineers & AI Scientists.

- The programme offers a set of core courses and elective courses, allowing students to gain expertise in Advanced Deep learning, Computational Learning theory, Speech Processing, Natural Language Processing, etc.

- The programme makes use of Tools and Technologies. These include Tensorflow for Deep Learning and various Python libraries for data processing, machine learning, OpenCV for computer vision, NLTK for NLP etc.

- The Dissertation (Project Work) in the final semester enables students to apply concepts and techniques learned 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 Virtual 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

- Option to submit fee using easy-EMI with 0% interest and 0 down payment.

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# PROGRAMME OBJECTIVES

▶ Abundance of user generated data, easy access to compute and storage in cloud, open-source libraries and algorithmic advancement have led to deployment of artificial intelligence and machine learning techniques across the industries.

▶ This in turn has fuelled significant job opportunities in the IT products and services sector in India and across the globe.

▶ This program is geared towards the professional development of employees who are working in the area of IT products and services industry or who wish to make a career in the applications of AI and ML techniques in traditional industries; and also address the needs of professionals who work in or want to make a career in online commerce or other online businesses etc.

# STUDENT LEARNING OUTCOMES

UPON PROGRAMME COMPLETION, LEARNERS WILL BE ABLE TO:

▶ Demonstrate conceptual understanding and hands on knowledge of traditional and contemporary AI and machine learning techniques, including deep learning, and reinforcement learning.

▶ Demonstrate conceptual understanding and hands on knowledge of AI application areas such as natural language processing, computer vision, robotics or cyber security

▶ Understand the system and software engineering requirements for implementing machine learning systems on large datasets and in resource constrained environments.

▶ Understand the underlying ethical issues in applying AI and machine learning

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# PROGRAMME CURRICULUM
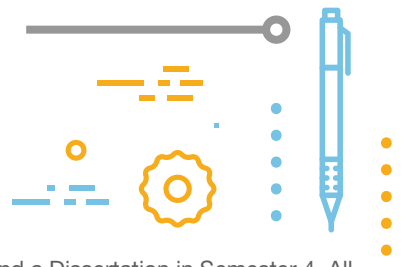
The programme features 12 courses between Semester 1-3, and a Dissertation in Semester 4. All the courses will be offered using live online mode.

| First Semester | Second Semester |
|---|---|
| Mathematical Foundations for Machine Learning | Deep Neural Networks |
| Introduction to Statistical Methods | Deep Reinforcement Learning |
| Artificial and Computational Intelligence | Elective 1 |
| Machine Learning | Elective 2 |
| **Third Semester** | **Fourth Semester** |
| Elective 3 | Dissertation |
| Elective 4 | |
| Elective 5 | |
| Elective 6 | |
| **Pool of Electives for Deep Learning Specialization** | **Pool of Electives for NLP Specialization** |
| Advanced Deep learning # | NLP Applications |
| Graph Neural Networks | Speech Processing |
| Distributed Machine Learning | Conversational AI |
| ML System Optimization | Social Media Analytics |
| Fair, Accountable, Transparent Machine Learning | Natural Language Processing # |
| Computational Learning Theory | Information Retrieval |

*Note: 3 courses are required including the course marked in #*

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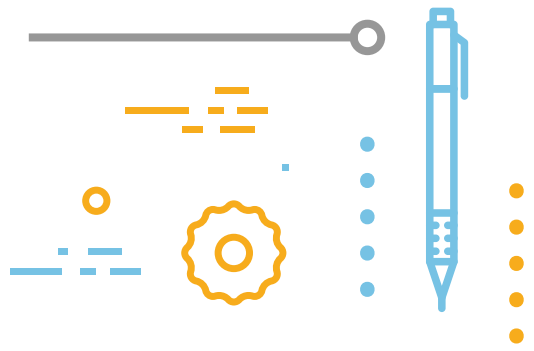
| General Pool of Electives | |
| --- | --- |
| MLOps | Data Management for Machine Learning |
| Design of Algorithms | Video Analytics |
| Computer Vision | Automated Reasoning |
| Probabilistic Graphical Models | Advanced Data Mining |
| Audio Analytics | AI and ML techniques for Cyber Security |
| AI and ML for Robotics | Metaheuristics for Optimization |

*Note: Choice of Electives is made available to enrolled students at the beginning of each semester. Students' choice will be taken a s one of the factors while deciding on the Electives offered. However, Electives finally offered will be at the discretion of the Institute.*

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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.

- 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 lecture videos, student notes, curated content etc. for select courses, through a learning management platform that is engaging and mobile-friendly.

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# EXPERIENTIAL LEARNING & LABS

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:

Simulation Tools, Platforms & Environments: Some or all of the following would be utilised across the programme.

Tensorflow for Deep Learning and various Python libraries for data processing, machine learning, OpenCV for computer vision, NLTK for NLP etc.

## PROJECT WORK

During the final semester participants carryout a semester-long intensive project work applying the various concepts learnt throughout the program guided by the organisation mentor and supervisor. Participants are provided access to virtual labs where applicable, and faculty expertise to support the project work.

## EXAMINATIONS & CONTINUOUS ASSESSMENT

The learners' performance is assessed continuously throughout the semester using various tools such as quiz, assignments, mid-semester and comprehensive exams. The assessment results are shared with the learners to improve their performance.

Each course will entail a minimum of 1 Assignment / Quiz, a mid-semester exam and a final comprehensive exam. Your semester calendar will clearly indicate the dates of the mid-semester and comprehensive exams. Typically, a mid-semester or comprehensive examination for a course is of 2-3 hours duration. The examinations are typically conducted over a weekend, i.e. Saturday and Sunday. These exams will be conducted either at the learners' office premises, or at another suitable location. Details regarding the exam location will be communicated at the beginning of the semester.

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# ELIGIBILITY CRITERIA

▶ Employed professionals holding B.E. / B.Tech. with at least 60% aggregate marks and minimum 18 months relevant work experience within HCL Technologies, are eligible to apply.

▶ Employed professionals holding MCA / M.Sc. or equivalent with at least 60% aggregate marks with university level mathematics / statistics as mandatory subjects and minimum 18 months relevant work experience within HCL Technologies, are also eligible to apply.

▶ Working knowledge of Computing and programming is required.

▶ The above are only the minimum criteria to apply. The final decision to offer admission to an applicant rests with BITS Pilani which will be made based on an overall review of your application information.

# FEE STRUCTURE

The following fees schedule is applicable for candidates seeking new admission during the academic year 2023-24:

| | |
|---|---|
| Application Fees (one time) | :INR 1500 |
| Admission Fees (one time) | :INR 16,500 |
| Semester Fees (per semester) | :INR 68,500 |

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# HOW TO APPLY

▶ **Click here** to visit the Online Application Center. 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.

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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.