BITS Pilani
Pilani | Dubai | Goa | Hyderabad

WORK INTEGRATED LEARNING PROGRAMMES

M.Tech. Artificial Intelligence & Machine Learning

https://bits-pilani-wilp.ac.in

Call:+91-80-48767777

admission@wilp.bits-pilani.ac.in

innovate achieve lead

As per Valuates Reports, The global artificial intelligence market size was valued at USD 65.48 billion in 2020 and is projected to reach USD 1,581.70 billion by 2030, growing at a CAGR of 38.0% from 2021 to 2030.

Prepare for a career in AI & ML with India's most comprehensive & world class M.Tech. Artificial Intelligence and Machine Learning Programme without taking a career break. The programme covers widest variety of skill & knowledge areas, and is a four-semester programme that helps IT professionals and Software developers build skillset required to advance their career as ML Engineers & AI Scientists, etc.

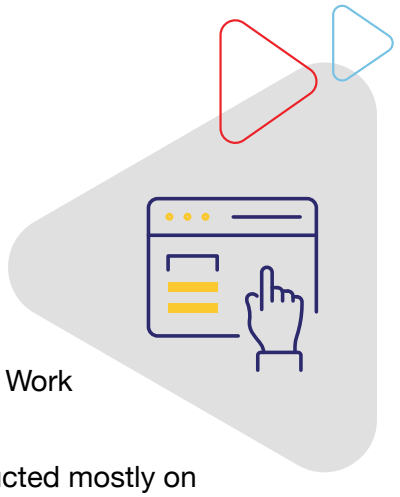
Who Should Apply?

IT and Software professionals working as Software Engineer, Software Developer, Programmer, Software Test Engineer, Support Engineer, Data Analyst, Business Analyst, who wish to transition to roles such as ML Engineers & AI Scientists, etc. should consider applying to this programme

M.Tech.
Artificial Intelligence and Machine Learning

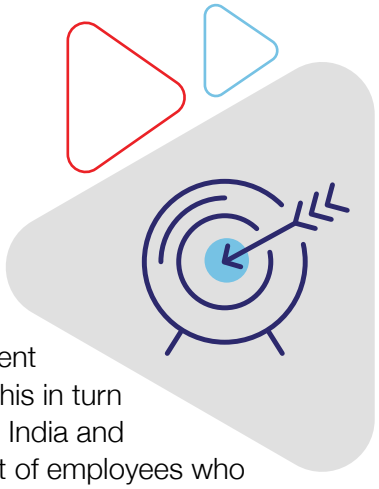
Apply Now

What are the Highlights of the Programme?



- 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.

What are the 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.

Learning Outcomes:

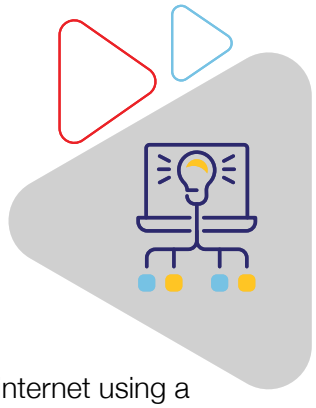
At the end of the programme, the students will be able to:

- ★ 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

M.Tech.
Artificial Intelligence and Machine Learning

Apply Now

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 Jan 2023 - Mar / Apr 2023 will begin in Mar / Apr 2023. 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 which includes recorded lectures from BITS Pilani faculty members, course handouts and recorded lab content where applicable.

CONTINUOUS ASSESSMENT

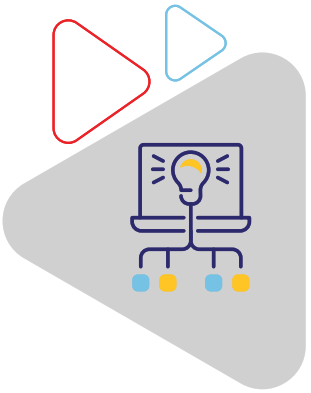
Continuous Assessment includes graded Assignments/ Quizzes, Mid-semester exam, and Comprehensive Exam.

Case studies and assignments

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

Dissertation

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 understanding of vital principles learnt across semesters and their ability to successfully apply these concepts.



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:

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.

Tools & Technologies covered

Spark · Apache Storm · OpenCV · python NLTK · Keras · TensorFlow · python

Supplementary learning

In addition to live weekly online lectures, supplementary live online sessions will be organised periodically comprising of tutorials, doubt-clearing interactions, and industry talks (18-20 hours per semester).

M.Tech.
Artificial Intelligence and Machine Learning

Apply Now

Mode of Examinations

Examinations Mode Options applicable for students admitted in Batch starting in March/April 2023.

Semester 1, 2 and 3 have Mid-Semester Examinations and Comprehensive Examinations for each of course. These examinations are mostly scheduled over weekends. During these semesters, in addition to the Mid-Semester and Comprehensive examinations, there will also be Quizzes/Assignments conducted online on the Learning Management System (LMS) as per the course plan in which the students need to participate. In Semester 4 (Final Semester), the student will be doing a Dissertation/Project Work as per the Institution's guidelines.

Two Options on Mode of Examinations during Semester 1 & 2:

The institution offers a choice between taking the examination Online or taking them at a Designated Examination Center. The student will choose one of the options depending on his or her own preference and circumstances. Both options are explained below:

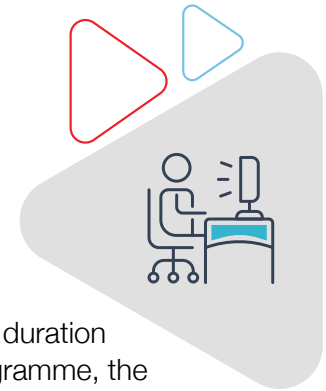
Online Examinations:

Students choosing this option can take the examinations online from any location e.g. office or home. To take an **Online Examination,** the student must possess **a Laptop or Desktop system with Two Web Cams (One Web Cam for the student's frontal face view and a Second Web Cam for the student's and Laptop or Desktop system's full side view during the exam)**, a smartphone and good internet connectivity.

Please **click here** to refer to the complete details about mandatory IT and Non-IT Infrastructure requirements for taking the online examinations. You should choose this option only if you are confident to arrange the required mandatory IT Infrastructure and Non-IT Infrastructure to take the examinations under this mode. Students opting for online examinations should log in to the institution's online examination platform as per the examination schedule and take the online examinations in compliance with the institution's defined instructions, guidelines, and rules which will be announced before the examinations.

Examinations at Designated Examination Centers:

Students choosing this option will need to appear in person for taking the examinations at the institution's designated examination centers. These designated examination centers are at the following locations: **Bangalore, Chennai, Delhi NCR, Hyderabad, Pune, Mumbai, Kolkata, Goa, and Pilani.** In addition to these locations, Institution also has a designated examination center in **Dubai**. Please note that the offering of examinations at designated examination centers is subject to the institution's assessment of the safety conditions as per prevailing pandemic conditions and also subject to a required minimum number of students preferring this option. The institution may choose not to offer this option, if as per its own assessment, the safety situation due to pandemic conditions is not conducive to conducting examinations at designated examination centers or if as per its assessment, an adequate number of students have not preferred for this option. In circumstances as explained, Institute will then conduct the examinations only in online mode.



Important:

The option of taking Online Exams for Semester 1 & 2 will remain available for normal duration of the programme. However, in case a student chooses to take a break from the programme, the options on the mode of examination available will be as prevailing at the time the student resumes the programme. Also, if a student has backlog course/s to successfully complete and due to which he/she needs to register in additional semester/s over and above the normal duration of the programmes, the options on the mode of examination available will be as prevailing at the time when a student registers for an additional semester.

Also note that The Institute regularly takes actions to optimize its examination system and hence the mandatory IT and Non-IT Infrastructure requirements, instructions, guidelines, and rules associated with online and designated examination center exams may change at the Institute's discretion. All students will need to 100% comply with any such changed specifications announced by the Institute.

Mode of Examinations for Semester 3:

One or both of the options on the mode of the examination as listed above for Semester 1 & 2 will be made available as per discretion of the institution. The institution's decision on the mode of examinations will take into account its assessment of the pandemic situation and any other feasibility constraints associated with each mode. The Institution's decision on the mode of examination to be offered to the student will be as per its sole discretion and students must comply with the institution's decision.

Mode of Evaluation for Semester 4 (Final Semester):

During Semester 4, students will be required to register for a full semester of Dissertation/Project work. Each submission required for the Dissertation/Project Work as per the institution's guidelines can be made **ONLINE** on BITS Pilani's approved and managed online assessment platform.

What is the Eligibility Criteria?

Employed professionals holding B.E. / B.Tech. with at least 60% aggregate marks and minimum one-year relevant work experience after the completion of the degree 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 one-year relevant work experience after the completion of the degree are also eligible to apply.

Fee Structure

The following fees schedule is applicable for candidates seeking new admission during the academic year 2022-2023.

Application Fees (one time)	Admission Fees (one time)	Semester Fees (per semester)
₹1,500	₹16,500	₹65,500

0% Easy-EMI Option

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

Click here **to learn more**

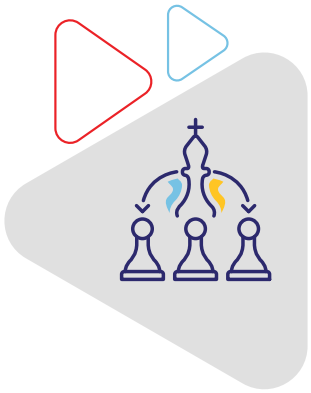
All the above fees are non-refundable.

Important: For every course in the program institute will recommend textbooks, students would need to procure these textbooks on their own.

M.Tech.
Artificial Intelligence and Machine Learning

Apply Now

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

- Mathematical Foundations for Machine Learning
- Introduction to Statistical Methods
- Artificial and Computational Intelligence
- Machine Learning

Second Semester

- Deep Neural Networks
- Deep Reinforcement Learning
- Elective 1
- Elective 2

Third Semester

- Elective 3
- Elective 4
- Elective 5
- Elective 6

Fourth Semester

- Dissertation

Pool of Electives for Deep Learning Specialization

- Advanced Deep learning #
- Graph Neural Networks
- Distributed Machine Learning
- ML System Optimization
- Fair, Accountable, Transparent Machine Learning
- Computational Learning Theory

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

Pool of Electives for NLP Specialization

- NLP Applications
- Speech Processing
- Conversational AI
- Social Media Analytics
- Natural Language Processing #
- Information Retrieval

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

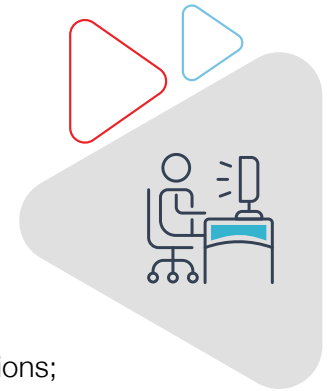
General Pool of Electives

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

M.Tech.
Artificial Intelligence and Machine Learning

Apply Now



COURSE WISE SYLLABUS

Mathematical Foundations for Machine Learning

Vector and matrix algebra, systems of linear algebraic equations and their solutions; Eigenvalues, eigenvectors and diagonalization of matrices, multivariate calculus, vector calculus, Jacobian and Hessian, multivariate Taylor series, gradient descent, unconstrained optimization, constrained optimization, nonlinear optimization, stochastic gradient descent, dimensionality reduction and PCA, optimization for support vector machines.

Introduction to Statistical Methods

Basic probability concepts, Conditional probability, Bayes Theorem, Probability distributions, Continuous and discrete distributions, Transformation of random variables, estimating mean, variance, covariance, Hypothesis Testing, Maximum likelihood, ANOVA – single factor, dual factor, time series analysis: AR, MA, ARIMA, SARIMA, sampling based on distribution, statistical significance, Gaussian Mixture Model, Expectation Maximization.

Deep Neural Networks

Introduction to neural networks, approximation properties, back propagation, deep network training, regularization and optimization, convolution neural networks, recurrent neural networks, attention models, transformers, neural architecture search, federated learning, meta learning, applications in time series modelling and forecasting, online (incremental) learning

Deep Reinforcement Learning

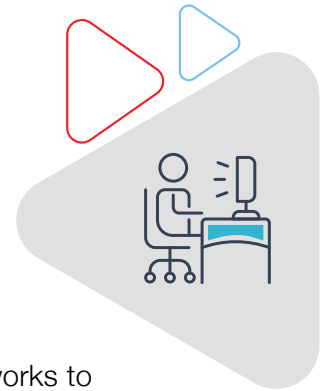
Introduction and applications. Markov decision processes(MDP), Tabular MDP planning, Tabular RL policy evaluation, Q-learning, model based RL, deep RL with function approximation, policy search, policy gradient, fast learning, applications in game playing, imitation learning, RL for neural architecture search, batch RL

Advanced Deep Learning

Introduction to Representation Learning, PCA and variants, likelihood based models, flow models, autoregressive models, latent variables, Deep autoencoders, Boltzmann Machines, Generative Adversarial learning, Variants of GAN and applications, DeepDream, neural style transfer, self-supervised learning, semi-supervised learning, language model learning, applications in time series modelling, representation learning for reinforcement learning, deep clustering

Graph Neural Networks

Basics of graph theory, machine learning on graphs, node embeddings, link analysis, representation learning for graphs, label propagation for node classification, empirical risk minimization, graph convolutional filters, composition with pointwise nonlinearities, permutations, dilation and stability, transferability, graph RNN, algebraic neural networks, applications of graph NN in subgraph amining,



recommendation systems, community structures in networks, deep generative models, knowledge graph embeddings and reasoning.

Distributed Machine Learning

Introduction to parallel and distributed models of computation: Scalable frameworks to parallelize machine learning algorithms, Data and computation heterogeneity, Data parallelism vs Model parallelism, Challenges: consistency, fault tolerance, communication, resource management, programming models; Distributed ML algorithms: K-means, DBSCAN, Distributed association rule mining: FDM, Linear and logistic regression; Distributed DL Algorithms: Gradient descent techniques for empirical risk minimization, SGD in Neural Network Training and its convergence analysis, Distributed Synchronous SGD, Asynchronous SGD, Hogwild, Local-update SGD, Decentralized SGD, Overlap SGD, Quantized SGD, Adacomm Vs Distributed SGD, Elastic Averaging, AdaSyn, AdaQuant; Federated learning: Privacy and security in federated learning; Hyper parameter optimization; In depth case studies of a few algorithms.

ML System Optimization

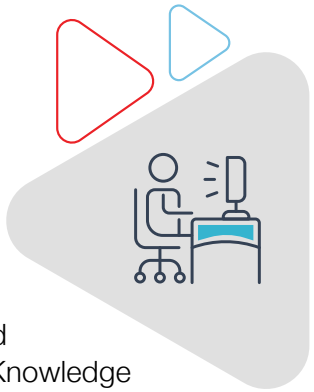
Review of parallel and distributed systems, System Performance Trade-offs, Distributed machine learning for large models and datasets, general purpose distributed computing frameworks - Hadoop, map reduce and Apache Spark, Deep Learning frameworks and runtimes, deep learning hardware, Deep learning compilers with optimizations, scalable training and Inference Serving , parameter serving, Federated Learning, model compression for optimizing communication and resource constrained devices, Case studies of machine learning on single GPU systems, on GPU Clusters.

Fair, Accountable, Transparent Machine Learning

Biases and fairness, fair representation learning, Interpretability and Transparency, Example and Visualization Based Methods for Interpretability, Interpreting deep neural networks, Fairness Through Input Manipulation, Fair NLP/Vision, Robustness and adversarial attacks/defence, ML auditing, privacy

Computational Learning Theory

Introduction. The PAC model, Overfitting and Occam's razor, The Online Mistake-Bound model, Combining Expert Advice / Multiplicative Weights, Regret Minimization, sleeping experts, The Perceptron Algorithm, Margins, and introduction to Kernels. SVMs, Uniform Convergence and VC-Dimension, Rademacher Bounds. Boosting. Statistical Query Model, Computational Hardness Results for Learning. MDPs and Reinforcement Learning. Differential Privacy and Learning. Semi-Supervised Learning.



NLP Applications

Sentiment Analysis, Grammar and Spelling Checkers, Cross Lingual Language Models, Machine Translation including Indic Languages, Question answering and Chatbots, Information extraction (named entity recognition, relation extraction), Knowledge graph

Speech Processing

Introduction to statistical speech processing. HMM, WFST and neural net based acoustic modelling, language modelling, acoustic feature analysis, neural networks for speech recognition, search and decoding, speech synthesis

Conversational AI

Intro to conversational AI, Use cases of chatbots, NLU and Dialog Management, Design the flow of conversation, Crafting training data, Training the NLU model, Understanding Dialog Management, Intent classification and entity extraction, using slots for context understanding, Understanding NLU components, supporting multiple languages, Voice bots, Testing the bot, Failing gracefully with fall back action

Social Media Analytics

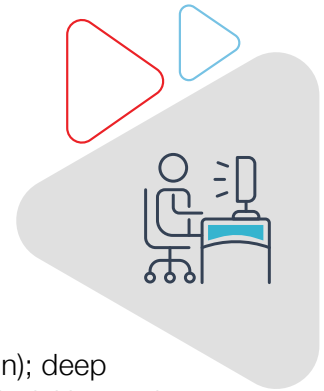
Social Media Platforms, NLP in SMA, Text Summarization, Opinion Science and dynamics, ML/DL in SMA- Community detection, Ethical Social Media, Case Studies- Role of social media in disaster management, SM driven mental health and behaviour Analysis

MLOps

Adaptation of DevOps for building and deploying machine learning systems, Model Deployment: Infrastructure requirements; Deployment patterns, Model CI/CD (Build, Test, Integration and Delivery of model); Model Serving tools and technologies; Model life cycle management, ML pipelines with data management support, model assessment, evolution and management in production, MLOps infrastructure and tools; Trends in Model deployment: ML on the Cloud / Edge / Browsers; VMs, Containers, Docker, Kubernetes (K8S), FaSS; ML-as-a-Service.

Design of Algorithms

Review of important data structures, Design techniques such as divide-and-conquer, greedy, recursion, backtracking, branch-and-bound, simulation, Dynamic Programming (Examples, Analysis, General Structure of Solutions, Limitations and Applicability); Illustrations dealing with problems in AI and machine learning; Computational complexity and bounds; NP-hard and NP-complete problems; Introduction to Approximation algorithms; Randomized algorithms.



Computer Vision

Image formation, structure, and transformations; Low-level(filters, features, texture), Mid-level(segmentation, tracking, morphology) and High-Level Vision (registration, contour geometry, object detection and classification, segmentation); deep learning for object detection; recognition; face detection and face recognition; Facial key point recognition;Optical Character recognition; visual annotation; Activity recognition; Applications for autonomous cars – Landmark detection and tracking, track pedestrians; 3D projection; Image search and retrieval; edge devices for computer vision

Probabilistic Graphical Models

HMM, Markov Random Field, Bayesian networks, Representation, Learning, Inference; Dynamic Bayesian Networks and Temporal Bayesian networks, applications.

Audio Analytics

Audio data; sound analysis using DFT, STFT, file formats; Spectrogram; Spectral features; Feature extraction from Audio signal; Sinusoidal model; Harmonic model; Sound transformations; Sound and music description; Automatic speech recognition - Acoustic Phonetics, Dialog, Speech Synthesis, Text to Speech (TTS); Meaning Extraction; Music genre classification; Indexing music collections; Recommending music; Speech processing and synthesis — generating artificial voice for conversational agents; tagging and generation; Similarity search for audio files; HMM; AI for ultrasonic and infrasonic applications

AI and ML for Robotics

Fundamentals of robotics. Aerial robots, warehouse robots, under actuated robots. Sensor systems for robots. Effectors and actuators. Robot Operating System. Robot motion models. PID control, Beam model of range finders. Recursive state estimation - Bayes filters, Kalman, extended Kalman, information filters, and nonparametric filters such as particle filters. Mobile robot localization - extended Kalman filter, Grid and Monte Carlo. Simultaneous mapping and localization algorithms, path planning algorithms, Instance based learning, demonstration based path planning using reinforcement learning, deep learning and reinforcement learning based mapping, navigation and control of mobile robots.

Data Management for Machine Learning

Data Models and Query Languages: Relational, Object-Relational, NoSQL data models; Declarative (SQL) and Imperative(MapReduce) Querying; Data Encoding: Evolution, Formats, Models of dataflow; Machine learning workflow; Data management challenges in ML workflow; Data Pipelines and patterns; Data Pipeline Stages: Data extraction, ingestion, cleaning, wrangling, versioning,

transformation, exploration, feature management; Modern Data Infrastructure: Diverse data sources, Cloud data warehouses and lakes, Data Ingestion tools, Data transformation and modelling tools, Workflow orchestration platforms; ML model metadata and Registry, ML Observability, Data privacy and anonymity.

Natural Language Processing

Natural Language Understanding and Generation, N-gram and Neural Language Models, Word to Vectors / Word Embedding (Skip gram/CBOW, Glove, BERT/ XLM, MURIL), Part of Speech Tagging, Hidden Markov Models, Parsing - Syntactic, Statistical, Dependency, Word Sense Disambiguation, Semantic Web Ontology.

Video Analytics

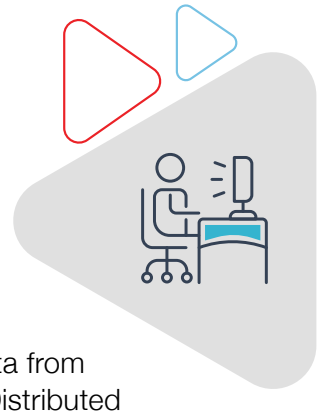
Digital Video; Spatio temporal sampling; Low-Level Features to High-Level Semantics; Video enhancement technologies (denoising, stabilization, unsharp masking, super-resolution); background modelling and Foreground Detection; ML techniques for Video Motion Detection; tracking; compression; Indexing and Retrieval; Browsing and Summarization; Applications in License plate detection on moving vehicles, monitor traffic jams; Activity recognition; crowd management; gesture recognition.

Automated Reasoning

Propositional Logic: Propositions and logical connectives, Propositional logical consequence, Logical equivalence, Inductive definitions and structural induction and recursion; Deductive Reasoning in Propositional Logic: Axiomatic systems for propositional logic, Semantic Tableaux, Natural Deduction, Clausal Resolution, Resolution-based derivations; First-order Logic: Syntax and Semantics of first-order logic, Logical validity, consequence, and equivalence, Syllogisms; Deductive Reasoning in First-order Logic: Axiomatic system for first-order logic, Semantic Tableaux, Natural Deduction, Prenex and clausal normal forms, Resolution, Soundness and completeness; Limitations: Hilbert's programme, Tarski's theorem on the undefinability of truth, Incompleteness of axiom systems, Godel's incompleteness theorem, Definability and decidability, Church's theorem, Church-Turing hypothesis.

Information Retrieval

Organization, representation, and access to information; categorization, indexing, and content analysis; data structures for unstructured data; design and maintenance of such data structures, indexing and indexes, retrieval and classification schemes; use of codes, formats, and standards; analysis, construction and evaluation of search and navigation techniques; search engines and how they relate to the above. Multimedia data and their representation and search.



Advanced Data Mining

Topics beyond conventional record data mining. Mining complex data structures. Tree/graph mining, sequence mining, web/text data mining, stream data mining, spatiotemporal data mining, mining multivariate time series data, high-dimensional data clustering, and mining social networking sites. Mining data from multiple relations (Multirelational Data Mining). Privacy preserving Data Mining. Distributed computing solutions for data intensive data mining

Artificial and Computational Intelligence

Introduction to Intelligent Agents; Search based agents - Informed and Uninformed searches; Local Search Algorithms - Hill Climbing, Simulated Annealing, Local Beam Search, Genetic Algorithms, ACO, PSO; Minimax Algorithm, Alpha Beta Pruning; Knowledge Representation and Reasoning: Logical Agents - Representation and reasoning using propositional and predicate logic, resolution, forward and backward chaining, DPLL; Probabilistic Reasoning - Knowledge representation using Bayesian networks, exact and approximate inference from bayesian networks; Hidden Markov Models; Ethics in AI: Explainable AI.

Machine Learning

Introduction to Machine Learning, Various kinds of learning, Supervised Learning, Unsupervised Learning, Model Selection; Bayesian Learning, MAP Hypothesis, MDL Principle, Bias Variance Decomposition, Bayes Optimal Classifier, Naive Bayes Classifier; Linear Models for Regression, Linear Models for Classification; Non-Linear models, Decision trees; Instance Based Learning, KNN Algorithm, Support Vector Machines, Ensemble methods: Random Forest, Bagging, Boosting.

AI and ML Techniques for Cyber Security

Introduction to Cyber-Security; Supervised Learning for Misuse/Signature Detection; Machine Learning for Anomaly Detection; Malware detection and classification; Network Intrusion detection and classification; Detection and categorization of domain names; Profiling Network Traffic; Adversarial Machine Learning for Malware detectio

Metaheuristics for Optimization

Metaheuristics refers to a class of approximation algorithms which can solve hard optimization problems within an acceptable time limit. This course covers principles behind such algorithms and application to real world problems. The algorithms covered in the courses include simulated annealing, evolutionary algorithms, ant colony method, and particle swarms.

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 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.

- 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.

M.Tech.
Artificial Intelligence and Machine Learning

Apply Now

How to apply

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

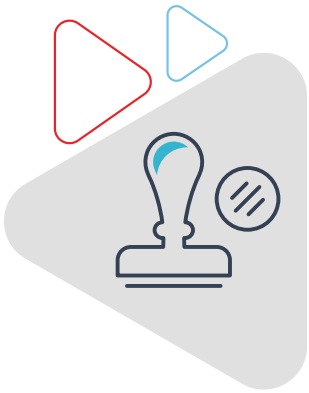
★ Finally, click on Step 4 - 'Upload & Submit All Required Documents'. This will allow you to upload one-by-one the printed Application Form, Mentor Consent Form, Employer Consent Form, and all mandatory supporting documents and complete the application process. Acceptable file formats for uploading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

BITS Pilani
Pilani | Dubai | Goa | Hyderabad

WORK INTEGRATED LEARNING PROGRAMMES



UGC Approval

BITS Pilani is an Institution of Eminence under UGC (Institution of Eminence Deemed to be Universities) Regulations, 2017. The Work Integrated Learning Programmes (WILP) of BITS Pilani constitutes a unique set of educational offerings for working professionals. WILP are an extension of programmes offered at the BITSPilani Campuses and are comparable to our regular programmes both in terms of unit/credit requirements as well as academic rigour. In addition, it capitalises and further builds on practical experience of students through high degree of integration, which results not only in upgradation of knowledge, but also in up skilling, and productivity increase. The programme may lead to award of degree, diploma, and certificate in science, technology/engineering, management, and humanities and social sciences.

On the recommendation of the Empowered Expert Committee, UGC in its 548th Meeting held on 09.09.2020 has approved the continued offering of BITS Pilani's Work Integrated Learning programmes.

https://bits-pilani-wilp.ac.in

Call:+91-80-48767777

admission@wilp.bits-pilani.ac.in