VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

About the Programme

Integrated M.Tech. (5 Year) Programmes 2024 - 25

VIT - A Place to Learn; A Chance to Grow

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Integrated M.Tech. Software Engineering (5 year)

The Integrated M.Tech. Software Engineering programme is a 5 year integrated course offered in these campuses of VIT i.e. Vellore-TN, Chennai-TN & Amaravati-AP.

The programme is offered with the following objectives:

- To understand and apply principles of software development and evolution.
- To specify, verify and validate solutions to large-size problems.
- To plan, develop and manage large software using state-of-the-art technology.
- To learn emerging trends in software engineering and project management.
- To expose students to quality standards, CASE tools and best practices.
- To analyze, design and develop high-quality software solutions.

Scope of Employment

- As software developers, architects, design engineers, testing and QA professionals.
- As project managers, consultants, solution developers and entrepreneurs.
- As high-end system design engineers.
- As configuration managers and system analysts.
- As academicians and researchers.

The programme contains following courses:

Computer Programming: Python / Data Structures and Algorithms / Digital Logic and Microprocessor / Embedded Systems and IoT / Structured and Object Oriented Programming / Computer Architecture and Organization / Computer Programming: Java / Object-Oriented Analysis and Design / Theory of Computation / Database Management Systems / Operating Systems / Software Engineering / Computer Networks / Requirements Engineering and Management/ Web Technologies / Software Architecture / Software Project Management Software Testing / Design Patterns / UI and UX Programming / Software Configuration Management / Software Metrics / Artificial Intelligence / Information and System Security / Agile Development Process and DevOps / Metaverse / Computer Vision / Full Stack Development / Cross Platform Application Development / Data Mining / Quantum Computing

There are also electives from core sciences, languages, management and social sciences to round one's personality. .

Our regular recruiters:

- ABSYZ Software Consulting
- Alstom
- Aptiv Components India
- Broadridge financial solutions
- ByteXL
- Capgemini
- Carat Lane
- Celebal Technologies
- Cerner Corporation
- Cleartax
- Clinic Spots
- Coforge
- Cognizant (GenC Next)
- Cognizant (Genc)
- Cognizant GenC (Elevate)
- Continental Automotive Corporation
- CySec Security Private Limited
- Deloitte
- Ericsson Global India
- FRUGAL PRODUCT SERVICES LLP
- Gemini Solutions Private Limited
- Genesys Telecom Labs
- HAVELLS INDIA
- Hexagon Capability Center India Pvt Ltd
- Impelsys
- Infineon Technology
- Intel Technology India Pvt. Ltd
- ITILITE Technologies
- KONE Elevator India Private Limited
- L&T Technology Services
- Lumiq.ai
- MIRRAR INNOVATION TECHNOLOGIES PVT LTD

- Motherson Sumi INfotech & Designs
- My Ways
- NetApp
- Nokia Solutions & Networks
- NXP Semiconductors
- Olam Information Services
- OLX India
- Paralaxiom Technologies Pvt. Ltd
- Pathkind Labs
- Philips
- Policy bazaar Power School India
- Power of N
- Qneuro India
- Qubercomm Technologies
- Quinbay Technologies
- Qwikcilver Solutions
- Red Sky Technologies
- Robert Bosch
- Samsung R&D Noida
- Samsung Electro Mechanics
- SAP Labs
- Senvion
- Signify Innovation Labs
- ST MICROELECTRONICS
- Stryker
- Tiger Analytics
- Utopus Insights Inc
- Viacom 18
- Vitrana
- Vocera Communications India
- VOLVO
- Wabtec
- Zenoti

Highest Package:

S Mohamed Fiaz (2022 Graduated)   Silicon Labs   - 22 L/Annum

Further details on the courses may be obtained from

http://www.vit.ac.in/academics/schools/site/courses.

.Integrated M.Tech. Computer Science Engineering in Collaboration with Virtusa (5 Year)

The Integrated M.Tech. Computer Science and Engineering in collaboration with Virtusa programme is a 5 year integrated course offered in these campuses of VIT i.e. Vellore-TN, and Amaravati-AP.

♦ Students who have successfully completed 12th Grade.

♦ Students develop essential skills to analyze, design, develop and evaluate high-end computing systems.

♦ Students are provided with the necessary infrastructure and guidance to undertake challenging projects and carry out research activity.

Important industry relevant courses offered:

♦ Big data technologies

♦ Machine Learning

♦ Internet of Things (IOT)

♦ Software Engineering and Modelling.

♦ Multicore architectures.

Key Features of program:

♦ To emphasize on both the theoretical as well as the practical aspects of Computer Science so as to meet the challenges of the technological changes.

♦ It is tailored to foster multidisciplinary research.

♦ Students develop essential skills to become analyse, design, develop an devaluate high-end computing systems.

♦ To provide the opportunities to work on specialised and specific domains with faculty in various research divisions.

Job opportunities in India / abroad:

♦ As Developers and specialists in high-end services and IT-product companies.

♦ As Development Engineers, Technical Leaders and Managers.

♦ As Academicians and Researchers in India and abroad.

♦ As Consultants, Solution Developers and Entrepreneurs.

♦ As Computing Specialists in Research Labs and as Technology Providers.

Integrated M.Tech Computer Science Engineering
(Data Science) (5 Year)

The Integrated M.Tech. Computer Science and Engineering (Data Science) programme is a 5 year integrated course offered in VIT – Vellore campus.

About the Programme

- Data Science is experiencing rapid and unplanned growth by the explosion of complex and rich data in science, industry and government.

- The major goal of this program is to impart theoretical knowledge and techniques to address any kind of creating, managing, processing and converting data into knowledge.

- This requires interdisciplinary areas namely algorithms, operating systems, databases, artificial intelligence, machine learning, probability and statistics, data warehousing, data mining, game theory, data analysis and data visualization.

- The main objective of data science and engineering is to make students to be familiar with how data science is used in other disciplines such as physical sciences, management and medicines.

Program Educational objectives

- Graduates will be engineering professionals, innovators or entrepreneurs engaged in smart and intelligent technology development, technology deployment, or engineering system implementation in industry.

- Graduates will function in their profession with social awareness and responsibility.

- Graduates will interact with their peers in other disciplines in industry and society and contribute to the economic growth of the country.

- Graduates will pursue career paths in teaching and research.

    Graduates will develop and deploy their skills to achieve a thorough knowledge in data science and engineering.

- Ability to aggregate, interpret and manage large amount of heterogeneous data resources independent of the hardware and software resources.

Outcomes of the program

The course will enable students to:

- Able to design storage structures to represent big data

- Apply artificial statistics and computational analysis for data to make predictions.

- Implement data mining techniques even on large set of data for clustering, classification and ranking of data.

- Apply evolutionary computing techniques to create an intelligent data management system.

- Use data analytics tools for big data analysis and generate the expected or appropriate reports using visualization tools

- Use python and R programming language to clean and process the data.

- Implement data intensive computing techniques using cloud infrastructure

Scope of employment

- There is a big demand for analytics, data mining and data science professionals in near future.

- This program will enable the students to develop their skill sets and competencies of data scientists as they play main role in competitive intelligence which is a newly emerging field that encompasses data mining and analysis.

- This programme offers students an in-depth education experience to focus on data science as it pertains to their unique interests.

- As part of this course the students can do industry interaction and take up research activities in the data science field.

The programme contains following Curriculum:

University Core

Environmental Studies / Ethics and Values / Effective English / English for Engineers / Soft Skills / Calculus for Engineers / Probability & Statistics for Data Science / Applied Physics / Engineering Chemistry / Problem Solving and Programming / Problem Solving and Object Oriented Programming / Co / Extra Curricular / Comprehensive Examination / Foreign Language / Industrial Internship.

Program Core

Discrete Mathematics and Graph Theory / Applied Linear Algebra / R Programming for Data Science / Basic Electrical and Electronics Engineering / Digital Logic and Design / Computer Architecture and Organization / Data Structures / Algorithms for Data Science / Database Management System / Software Engineering / Theory of Computation & Compiler Design / Operating System / Introduction to Data Science / Parallel and Distributed Computing / Internet and Web Programming / Microprocessor and Interfacing / Network and Communication / Data Mining / Machine Learning for Data Science / Cryptography & Cyber Security / Advances in Data Engineering / Big Data and Analytics / Java Programming.

Program Electives

Natural Language Processing / Deep Learning / Intelligent Databases / Network Algorithmics / Social Network Analysis / Computer Graphics / Computer Vision & Image Analysis / Data Compression & Multimedia / Randomized Algorithms / Cloud Computing / Pervasive Computing / Information Retrieval / Software Quality and Testing / Distributed Databases / Security Modelling and Analysis / Internet of Things / Soft Computing / Statistical Inference & Modeling / Exploratory Data Analysis & Visualization / Mobile Computing / Artificial Intelligence / Wireless Networks / Open Source Operating System Internals / Computational Foundations for Robotics / Knowledge Engineering / Object oriented software development / Virtualization / Embedded System Design / Image Processing / Object Oriented Databases.

Integrated M.Tech Computer Science and Engineering

(Business Analytics) (5 Year)

The Integrated M.Tech. Computer Science and Engineering (Business Analytics) programme is a 5 year integrated course offered in VIT – Chennai campus.

Program Educational objectives

- Graduate will acquire fundamental knowledge and expertise essential for professional practice in computer engineering.

- Graduates will use suitable principle, hypothesis, mathematics and computational technology to analyze and solve problems encountered in the applications of computer systems.

- Graduates will own a professional attitude as an individual or a team member with contemplation for society, professional ethics, environmental factors and motivation for lifelong learning.

- Graduates will communicate, using oral, written and computer based communication technology, as well as function effectively as an individual and a team member in professional environment.

- Graduates will realize the local, national and global issues related to the growth and applications of computer systems and to be solicitous of the impact of these issues on different cultures.

Outcomes of the program

The course will enable students to:

- Having an ability to apply mathematics and science in engineeringapplications.

- Having a clear understanding of the subject related concepts and of contemporary issues.

- Having an ability to design a component or a product applying all the relevant standards and with realistic constraints.

- Having an ability to design and conduct experiments, as well as toanalyze and interpret data.

- Having an ability to use techniques, skills and modern engineering tools necessary for engineering practice.

- Having problem solving ability-solving social issues and engineeringproblems.

- Having adaptive thinking and adaptability.

- Having a clear understanding of professional and ethical responsibility.

- Having cross cultural competency exhibited by working in teams .

- Having a good working knowledge of communicating in English.

- Having a good cognitive load management [discriminate and filter theavailable data] skills.

- Having interest in lifelong learning.

Scope of employment:

♦ There is a big demand for Data analytics, Business Analyst and Business Intelligence Expert in near future.

♦ This program will enable the students to develop their skill sets to take up the job roles such as Data Analysts, Data Scientists, Database Administrator, Data Engineer, Machine Learning Engineer, Business Intelligence Analyst, Business Analyst and Data Manager or pursue a research career.

♦ This programme offers students an in-depth education experience to focus on data Science, Business Analytics and Machine learning domains.

The programme contains following Curriculum:

University Core:

Environmental Studies / Ethics and Values / Effective English / English for Engineers / Soft Skills / Mathematics for Engineers / Probability & Statistics for Engineers / Engineering Physics / Accounting for Engineers / Problem Solving and Programming in C / Problem Solving and Object OrientedProgramming in JAVA/ Technical Answers for Real World Problems (TARP / Co / Extra Curricular / Comprehensive Examination / Foreign Language.

Program Core:

Linear Algebra & Transform Techniques / Optimization Techniques / Foundations of Electrical and Electronics Engineering / Digital Logic and Computer Organization / Data Structures and Algorithms / Database Management Systems / Software Engineering / Operating Systems / Design and Analysis of Algorithms / Theory of Computation and Compiler Design /Computer Networks essentials / Exploratory Data Analysis / Programming for Data Science Introduction to Data Science and Business Analytics / Machine Learning / Big Data Frameworks / Information Visualization / Network security and cryptography fundamentals Deep learning / Business analytics with spread sheet modelling / Human Resource Management / Operations research and Management/ Marketing Management/ Big data computing for Business Analytics/ Financial Management.

Program Electives:

Parallel Programming/ Blockchain Technologies/ Cloud Application Development/ Cloud Ecosystem/ Internet of Things/ Digital Image Processing/ Information Retrieval and Organization/ Natural Language Processing/ DevOps/ Artificial Intelligence &Knowledge-Based Systems/ Speech Processing/ Bioinformatics/ Computer Vision/ Predictive Analytics with Case Studies/ Forensics analytics/ Big Data Ecosystem/ Data Privacy/ Healthcare Analytics/ Real-Time Analytics/ Image and Video Analytics/ Social Media Analytics/ Text & Web Mining/ Massive Data Mining/ NoSQL Databases/ Soft Computing/ Recommender Systems/ Sequential and Spatial data Mining/ Operations Analytics/ Lean Six Sigma Principles/ Econometrics/ Supply Chain Analytics/ Neuro Marketing/ Financial Analytics/ Customer Relationship Management/ Accounting Analytics/ Risk and Fraud Analytics/ Marketing Analytics/ Digital and Social Media Marketing/ Behavioural Analytics/ Retail Analytics/ Product Lifecycle Management/ Investment and Bankinganalytics/ HR Analytics.

Further details on the courses may be obtained from;

https://chennai.vit.ac.in/computer-science-engineering-chennai/ba/

Integrated M.Tech Artificial Intelligence (5 Year)

The Integrated M.Tech. Artificial Intelligence programme is a 5 year integrated course offered in VIT – Bhopal campus.

♦ The artificial intelligence and machine intelligence technologies bring more complex data-analysis features to existing applications. Therefore, there is a thrust in using machine learning approaches to build new solutions.

♦ Artificial Intelligence (AI) has become an integral part of technology in our daily lives, be it driving to office, searching for a restaurant, getting news updates on your interested topics, and recommendations on social media, etc.

♦ With increase in usage, there is a significant requirement of researchers who can understand AI and build AI technologies for problem solving knowledge acquisition, Knowledge representation and Reasoning, Knowledge Based Decision making in various application domains.

♦ This M.Tech program will provide students an opportunity to specialize in Knowledge Engineering through an opportunity to learn both foundational and experimental components of AI and Machine Learning.

Program Educational objectives

The objectives of this programme are:

♦ To study the concepts of Artificial Intelligence from intelligence agent's perspective

♦ To analyse the application knowledge and to represent it using a suitable knowledge representation techniques

♦ To design analyse algorithms for searching the knowledge base using heuristics

♦ To conceptualize the knowledge base using proposition and predicate logic and to perform deductive inference using resolution and both forward and backward reasoning

♦ To handle uncertainty by applying machine learning techniques, fuzzy logic, rough-sets and spatial-temporal reasoning

♦ To perform data analysis using classification based on supervised learning techniques

To understand learning and deep learning methods for performing reinforcement learning

Program Outcomes

♦ The student is able to design agent based intelligent systems for engineering and commercial applications

♦ Suitable knowledge representation techniques including ontology are identified and applied for information retrieval and Web mining effectivelyShortest path algorithms are applied for searching the knowledge stored in the knowledge base to minimize the overall search cost

♦ Mathematical methods are applied to represent crisp-set knowledge and to answer the queries through syntactic manipulation of well-formed formulas

♦ The students are capable of building Bayesian networks, temporal constraint networks, and fuzzy inference system to handle incomplete information for decision making

♦ The students could apply the learning techniques for binary classification, multi-label classification by the implementation of Neuro-fuzzy models and fuzzy classification techniques

♦ The students could carry out predictive analysis, explanation based reasoning, planning and learning

Scope of employment:

1. According to a survey 37 percent of organizations have now deployed AI. 270 percentage increase from four years ago.

2. 50% of companies report that they have adopted AI in at least one business function.

3. 85% of organizations are using AI and most are using it in production; the top three areas for AI use are research and development, IT, and customer service.

4. 20%top skills shortages are of ML modelers and data scientists (58%) and data engineering (40%); reported by 26% of companies.

5. 83% of businesses say AI is a strategic priority for their businesses today.

6. 31% of marketing, creative, and IT professionals worldwide plan to invest in AI technology in the next 12 months.

7. 61% of business professionals point to machine learning and AI as their company's most significant data initiative for next year.

8. 27% of executives say their organization plans to invest this year in cybersecurity safeguards that use AI and machine learning.

9. The AI market will grow to a $190 billion industry by 2025, according to research firm Markets and Markets.

10. China will reap the most economic benefit from AI by 2030.

CURRICULUM

PROGRAMME CORE

Advanced Data Structures and Algorithms Analysis / Advanced Operating Systems and Virtualization / Advanced Database Technologies / Artificial Intelligence: Principles and Techniques / Machine Learning Techniques / Advanced Computer Networks / Multicore Architectures and Organization / Natural Language Processing/ Artificial Neural Networks/ Optimization Methods in Machine Learning/ Hardware Architecture for Machine Learning/ Introduction to Drones/ Data Visualization/ Cloud Computing. Natural Language Processing, Artificial Neural Networks, Optimization Methods in Machine Learning, Hardware Architecture for Machine Learning, Introduction to Drones, Data Visualization, Cloud Computing.

PROGRAMME ELECTIVE

Big-data Analytics / Cryptography and Security / Web Technologies / Data warehousing and Mining / Advanced Compiler Design and Optimization / IoT Design and Applications / Soft Computing Techniques / Digital Imaging Techniques and Analysis / Knowledge Engineering and Intelligent Systems / Statistical Natural Language Processing / Deep Learning and its Applications / Fuzzy Logic and its Applications / Intelligent Information Retrieval/ Bayesian Data Analysis/ Knowledge Engineering / Human-Computer Interaction/ Agent-Based Intelligent System/ Data Analytics using Scala Programming/ Expert Systems and Fuzzy Logic/ Computational Intelligence/ Cognitive Analytics/ Advanced Associative Data Analytics. Bayesian Data Analysis, Knowledge Engineering, Human-Computer Interaction, Agent-Based Intelligent System, Data Analytics using Scala Programming, Expert Systems, and Fuzzy Logic, Computational Intelligence, Cognitive Analytics, Advanced Associative Data Analytics.

Integrated M.Tech. Computer Science and Engineering

(Computational and Data Science) (5 Year)

The <u>Integrated M.Tech.</u> Computer Science and Engineering <u>(Computational and Data Science) programme</u> is a 5 year integrated course offered in VIT – Bhopal campus.

About the Programme

♦ The programme is designed for students who would like to become Computer Science Engineers specialized in Computational Systems and Data Science.

♦ The study of Computational Systems involves in mastering the design, development and analysis of high performance, parallel, scalable software and hardware. Likewise the study of Data Science involves in mastering in Big Data Analysis, Image Analysis, Data Visualization, Machine Learning, Artificial Intelligence, Distributed Systems and Cloud Computing.

♦ The fourth industrial revolution namely Industry 4.0 includes key technologies like Cloud Computing, high performance computing, Big Data Analytics, Image Analysis. The programme inculcates the technologies and skills required for the future jobs in the IT industry. It also provides courses which develop research aspirations.

♦ VIT Bhopal has bells and whistles to offer this course for the student fraternity through which they can be enlightened in their professional life.

Curriculum Highlights

♦ The programme equips the student with basic foundations in Computational and Data Sciences.

♦ It indoctrinates advanced research based skills as a master of computational and data engineer.

♦ In addition to the subjects of a B.Tech Computer Science and Engineering programme, the graduate will also learn the following subjects:

Scalable Systems, Data Analysis and Visualization, Machine Learning, Parallel Programming, Cloud Computing, System Virtualization, Deep Learning for Computer Vision, Data Science, Numerical Linear Algebra, Hybrid Parallel Algorithms etc. The programme also requires three dissertation based projects to be completed in the final semesters to enable the graduates to become industry ready.

Integrated M.Tech. Computer Science and Engineering

(Cyber Security) (5 Year)

The Integrated M.Tech. Computer Science and Engineering (Cyber Security) programme is a 5 year integrated course offered in VIT – Bhopal campus.

About Cyber Security

♦ In this age of quick information, Internet is the engine that is ushering global economic growth, connectivity & relentless communication.

♦ The issues related to cyber security of any country, should not impede any of these factors.

♦ Instead it is important to create such initiatives and be well-equipped to face and take head-on those cyber offences, that could cause espionage, infringement into copyrights, financial thefts, stealing personal data etc, which can threaten security, financial issues and confidentiality of a person, organization or even a nation.

♦ It is no exaggeration to say that the battles in the future will probably be fought in cyberspace instead on land or sea, with the targets being critical infrastructure such as dams and power grids and even healthcare.

♦ This has already been attempted in the past. Till date, more than 26,000 websites have been defaced and 91 lakh infected systems have been detected in India. The year 2016 saw over 3 million debit cards getting hacked in India.

♦ Worse, 80% of all cybercrimes go unreported!

♦ This makes it super important that India fortifies its critical infrastructure and evolves a mechanism that can be practically implemented in case of any cyber breach.

And this is where the role of cyber warriors comes in.

Career Prospects

♦ 3.5 million gobal shortage of Cyber Security professionals by 2021

♦ Hackers Attack Every 39 Seconds.

♦ The cyber security market in India is expected to grow from USD 1.97 billion in 2019 to USD 3.05 billion by 2022

♦ India's yearly cyber premium in range of INR80-100Cr. (USD11TO 14 Mn)

♦ India and the US have the largest cyber security talent pool.

♦ The IT Governance Analyst is responsible for providing IT governance, and will align IT investments with enterprise business goals, as well as Bureau and Agency guidance.

♦ An ethical hacker, also referred to as a white hat hacker, is an information security expert who systematically attempts to penetrate a computer system, network, application

♦ An expert witness who testifies or gives digital forensic related opinions at a dispute resolution trial or hearing by virtue of his/her specialized knowledge.

♦ A Vulnerability Assessor (a.k.a. Vulnerability Assessment Analyst) scans applications and systems to identify vulnerabilities

♦ A penetration tester is a type of network security consultant that tries to break into or find possible exploits in different computer systems and software. You can think of them as a type of ethical hacker.

♦ CISO is the senior-level executive within an organization responsible for establishing and maintaining processes to ensure information assets and technologies are adequately protected.

♦ The Security Compliance Analyst is responsible for monitoring, managing and closing existing

compliance issues while also ensuring that internal systems are compliant with security standards.

♦ The Security Transformation Consultant's responsibility is to lead Strategy, Assessment, Transaction or

Sourcing Management engagements