



M.Tech. (IT in Building Science)

International Institute of Information Technology, Hyderabad



"Safety, comfort, energy efficiency, affordability and healthy environment are the hallmarks of any modern construction. In order to achieve these qualities, Information Technology can be used with great effect in designing and building. IT in Building Science is all about combining traditional materials with advanced methods, using computer aided techniques for intelligent controls, meeting stiff design targets, and ensuring excellent performance of the building over its entire lifecycle, taking into consideration factors like wind, noise, solar energy, pollutants and occupancy. It is a multi-disciplinary science, integrating computer science with structural, electrical & mechanical engineering and architecture."

*BUILDERS OF BETTER TOMORROW
NURTURED, ENERGIZED, UNLEASHED*



THE INSTITUTE

The **International Institute of Information Technology**, Hyderabad is a small family beaming with colours of the spectrum spread across the entire nation. We are a population of over 600 students representing almost all parts of the country, but our large, green field campus spread over 62 acres has allowed expansion without the overcrowding so obvious elsewhere.

The site is approximately 20 km west of the city of Hyderabad abutting the prestigious Indian School of Business, Hyderabad Central University, sharing a common boundary with Balayogi stadium and only 10 minutes drive away from the Hitech City.

Our excellence in teaching and research has contributed towards building up, in a very short span of time, a formidable image to reckon with and this has been confirmed by strong partnerships with major national and international IT companies through their corporate schools and research centers on the campus and also continuous support from the state government.



The institute imparts broad interdisciplinary IT education of the highest academic quality and focuses on the area of applied research and development. The overall development of each student is effectuated through an integrated curriculum consisting of a diverse set of IT courses, relevant research courses and close interaction with the industry along with grounding in entrepreneurship. We at IIIT have a commitment to build bridges to connect the powerful resource of Information Technology to human life and we firmly believe that IT is and must be a tool that can do wonders - for the society, for the common man. What use is technology if it remains confined to research laboratories or is too expensive to afford? IIIT's mission is to serve this cause and to create leaders in information technology who will use their power to improve the quality of human life. The Institute aims at setting new standards in IT education and research for solving real life problems. Apart from competent core faculty, experts from corporate schools, reputed academicians and renowned professionals from industry have come together to match the standards of the worlds' best technical institutes. If you have a passion you can come and be a touchstone of an enriching experience which complements not only career values but serves as an acid test for a holistic learning. In sum, IIIT offers different interfaces for professionals, students and industry to work collaboratively for a better tomorrow.

IT IN BUILDING SCIENCE



"Dr. Vishal Garg is presently working as an assistant professor and also as course Co-coordinator of MTech in IT in building science course. He did his BE civil from MBM Engineering College, Jodhpur He did his PhD from IIT, Delhi. His research areas being Smart occupancy sensor, task controlling lighting, heating, air conditioning using fuzzy logic, fuzzy logic based protocol for wireless sensors network, Intelligent Buildings."

Building Science is a synthesis of Civil Engineering and Architecture. It involves all stages of building design, right from formulation of the concept, preparation of drawings, execution of work to maintenance and demolition of buildings. The building should have structural integrity, functional efficiency and aesthetics and provide quality environment for the occupants. Such buildings would be affordable, energy efficient, comfortable, safe, responsive to inhabitants and provide a healthy environment.

Introduction of computer techniques, new construction methods and approaches in building design, earthquake loadings and need for conservation of energy has created a demand for professionals who have specialized training in creating new building systems. This calls for a specialized course, which provides a deep understanding of the building process and the existing and emerging IT tools.

The M.Tech. (IT in Building Science) is an interdisciplinary programme open to graduates from the fields of architecture and civil engineering. It has a focus on research and development of advanced information technology tools and their application in building science for the design of better construction methods and buildings. The aim is to minimize the costs involved over the entire life cycle of these buildings. The curriculum has an integrated approach for solving problems in the industry by providing a synthesis of IT techniques and Building Science.

We place great emphasis on ensuring that our students are offered first class lectures, tutorials and practical classes by committed faculty members. Graduates from this programme will find that their education has equipped them with the knowledge to handle challenging assignments in the building and construction industry. We hope you will find this brochure useful and informative. We invite you to visit the institute and discover the value we offer to businesses, professionals and prospective students.

Vishal Garg
Coordinator

M. Tech. (IT in Building Science) is an innovative programme. It is a two year programme and students come with a background in architecture or civil engineering. The focus of this programme is on two aspects: multidisciplinary approach and IT tools for Building Science.

Application of IT tools requires creativity, a logical mind and analytical ability. The course provides an excellent grounding in the fundamentals of related IT tools. The course then, engages in a comprehensive study of core areas of computer science such as databases, graphics, networks etc. This course helps the students to confidentially address the challenges related to IT applications.

Building Science is a multidisciplinary science. The central thread of this programme is architectural creativity. Aesthetically pleasing forms and shapes are modeled and visualized using IT tools. Load transmission through such shapes requires considerable insight into their structural behaviour. The course provides an in depth study of Structural Analysis and Design with emphasis on numerical analysis and use of computers. Structural response to earthquake and other time varying effects are covered in detail.

Comfort is a major concern and its handling requires knowledge of thermal sciences and practical aspects of heat, ventilation and air conditioning systems. Sciences of light and acoustics influence the functional aspects of a building. In all major buildings, automation and intelligence are gaining importance, and this requires knowledge in signals, systems, control theory and embedded systems. The Building Science programme integrates all these components so as to create an aesthetically pleasing, healthy, safe, comfortable and affordable built environment for the society.

Graduates of this programme will come with a wide exposure in all these relevant areas and specialization in area of their choice. This would enable them to cope with the new trends and research in the Building Industry. They are exceptionally well prepared for effective application of IT tools in various phases and components of the Building Industry.



"Dr. Venkateshwarlu did his PhD from University of Waterloo, Canada. His research areas are discrete systems, wave phenomena in solid media, finite element models, probability, statistics, and stochastic processes in engineering applications."

[Dr. M. Venkateshwarlu](#)
Professor

A Post Graduation course in IT in Building Sciences offers graduates from Civil Engineering & Architecture a unique opportunity to leverage power of IT to develop Innovative solutions in their domain. The course is a perfect blend of Domain and IT courses. The Programme facilitates specialization in two streams:

1. Building Automation.

2. Structural Engineering.

A brief discussion of the courses in the two domains follows.

Structural Engineering Stream:

Domain courses

Finite Element Analysis

- Discretization by finite elements
- Element stiffness matrix
- Derivation by energy methods
- Assembly of elements
- One dimensional elements
- 2D Elements (Triangular and quadrilateral)
- Isoparametric formulations
- Gauss quadrature
- Solutions of problems in theory of elasticity
- Eigenvalue problems & Time varying problems

Tools: Matlab, ANSYS

Dynamics & Control of Structures

- Discrete systems - single degree of freedom and multi degree of freedom.
- Modal analysis of structures.
- Structural response of frames to time varying loads
- Earthquake Resistant Buildings

Numerical methods in Structural Mechanics

- Finite difference method, Central difference method and Newmark's method.
- Analysis of linear and non-linear responses.
- Continuum modeling and Discrete modeling.

Linear Analysis of Structures

Analysis of structures covering major areas related to:

- Analysis of plane and space trusses and frames.
- Direct stiffness method Developing computer programme for

- analysis of structures.

Tools: STAAD, CATIA, ANSYS

Computer Methods for Structural Design

Advanced design of structures using generic algorithms:

- Limit State theory of reinforced concrete
- Design of beams, columns, slabs for bending & shear
- Design of building frames
- Design of foundation

Development of algorithms for computer aided design

Earthquake Engineering

- Introduction to Seismology.
- Response of structures to Earthquake forces.
- Concept of Earthquake resistant design.
- Post Earthquake evaluation of structures.

Mathematical Modeling & Analysis

- Ordinary differential equations
- Fourier series and Fourier transforms
- Laplace transform
- Linear algebra
- Eigen value problems

Tools: Matlab

Probability Models

- Probability
- Random variables
- Random process
- Hypothesis testing
- Linear statistical models

Building Automation Stream:

Illumination Engineering

Theoretical foundation and computational approaches in building illumination:

- Light and vision
- Light sources and their classification
- Lighting calculations using zonal cavity method and point-by-point method
- Lighting design
- Lighting simulation
- Day lighting
- Light control

Tools: Lumen Micro, Radiance, Rayfront

Functional Efficiency and Services

Design optimization for minimization of energy loads. Acoustics, fire protection, elevators, wiring, access control and indoor air quality

Tools : Power DOE, DOE, Energy Plus, GenOpt, Fire Dynamics Simulation

Computer Aided Design and Visualization

Basic concepts of graphics, hands on practice on standard packages like Architectural Desktop 2000i, 3D Studio Max and CATIA for 3D views and walkthroughs as applied to the buildings.

Heating, Ventilation & Air Conditioning

- Heat transfer
- Thermal insulation
- Thermal comfort
- Climatology
- Heat gain/losses through building components
- Thermal body
- Ventilation
- Air conditioning
- Solar passive concepts
- Thermal simulation of buildings
- Calculation of heat loads
- HVAC Equipment



Integrated Building Design

- This project based course is in response to the increasing demands from the building industry for a more integrated approach to education as a means of securing closer and more effective collaboration among building design professionals.
- The course provides the opportunity for graduate building design professionals (architectural, Structural and management) to work in multidisciplinary teams in an integrated design studio environment.
- The course focuses on the application of advanced design methods, strategies and technologies, the categorical imperative to design for sustainability, and professional practice and management issues.

Building Automation

- Control theory
- Sensor technology
- Fuzzy Logic concepts and applications
- Wireless sensors
- Electronic circuits
- BACnet, Lon works, X-10 protocols.

Tools: Matlab



Intelligent Buildings

- Applications of artificial intelligence techniques in buildings to improve building performance and comfort.
- Use of techniques like Fuzzy Logic, Neural Networks, and Genetic Algorithms to make intelligent systems.
- Hardware implementation and study of such systems in laboratory

Tools: Matlab



Electives in IT:

In addition to the foundation courses, the students are encouraged to take advanced courses in IT

Computer Graphics

2D Graphics, Intensity and Colors, 3D Graphics, Representing Objects, Visible Surface Determination, Lighting and Shading.

Database Management Systems

Database design process, data models, relational and distributed database system, SQL, normalization, file structures and indexing, query processing and optimization, transaction management, concurrency control and recovery

Computer Networks

Introduction to computer networks, Layered Models, Communication Media, OSI Layers, Layers Protocols, Network Devices, Routing Protocols, QoS, Network Management Systems and Protocols

Data Structures and Algorithms

Arrays, Lists, Stacks, Queues, Trees and Sorting algorithms including implementations

Software Engineering

Introduction, Tools, Models and Methodologies UML,RUP,XP, OO Software Engineering Requirements,Elicitation,Analysis,System Design,Object Design, Rationale Management,Testing,Configuration

PROJECTS

IIIT emphasizes on working in close collaboration with the industry and encourages students to work on real life problems for their projects.

Following is the list of companies where the students are working for their final semester projects:

- Bentley Systems, New Delhi
- CADS India Pvt. Ltd., Chennai
- Crushman & Wakefield, Hyderabad
- Intergraph, Hyderabad
- Larsen & Toubro Infotech Ltd., Chennai
- Structural Engineering Research Center, Chennai
- SoftTech, Pune
- Satyam Computers, Hyderabad
- Tata Honeywell, Pune
- Tata Consultancy Services, CAD/CAM Division, Hyderabad
- Vanenburg Business IT Solutions, Hyderabad
- W S Atkins, Bangalore

The project titles are:

- Computer aided analysis of medium span bridges
- Development of software module for implementing mesh generation algorithms
- Development of module for FINEART: error estimator for 3D solid elements and is a package developed for SERC and ZAM, Germany
- Development and Customization in UniGraphics using UG/OpenAPI (UFUNC), UI Styler and C language.
- Development of system for virtual walkthrough using polarization technique.
- Forecasting residential prices using artificial Neural Networks
- Optimization of control methods for HVAC and lighting
- Prediction of construction projects' duration and cost using Knowledge Discovery Databases
- Web interface for Building Management Software: Enterprise Building Integrator, Honeywell.

PLACEMENTS

A few of the companies with which the previous batch is working include:

- Research Engineers (Pvt.) Ltd
- CADS India Limited
- L & T ECC
- Parametric Technologies Corporation
- Satyam Ventures Engineering Services
- Mahindra Raj Consultants
- Johnson controls
- L&T Infotech
- Frost & Sullivan
- Tata Honeywell
- TCE Consulting Engineers
- Chestestron Meghraj
- Crushman & wakefield
- Bentley Systems

STUDENTS

Profiles of the Students of the Present Batch:

Name	Institution	Qualification	Years of Experience
Structure			
Neeru Gupta	Thapar Institute of Engineering and Technology, Patiala.	B.E. (Civil)	0
V Goutami	Chaitanya Bharathi Institute of Technology, Hyderabad.	B.E. (Civil)	8
Prashant Kumar	Regional Engineering College(NIT),Kurukshetra,Haryana.	B.E. (Civil)	0.5
V.L.Kameshwari	Chaitanya Bharathi Institute of Technology, Hyderabad.	B.E. (Civil)	0
Tijo Thomas	Government Engineering College, Trichur, University of Calicut, Kerala	B.E. (Civil)	2
Automation			
Ruchi Sobti	Sushant School of Art and Architecture, Gur gaon, Haryana	B.Arch.	1
Gurneet Singh	Chandigarh College of Architecture, Punjab University.	B.Arch.	0
Swaha Mishra	Piloo Modi College of Architecture, Utkal University, Orissa.	B.Arch.	0
G.Sambabu	Regional Engineering College, Trichy, Tamil Nadu	B.E. (Civil)	3.5
K.V.Krishnan	Sri Venkateswara College Of Architecture	B.Arch.	1.5

Academic background of the first batch

- Centre for Environment Planning & Technology, Ahmedabad
- Chandigarh college of Architecture, Chandigarh
- Chaitanya Bharti Institute of Technology, Hyderabad
- College of Technology, Pantnagar
- G. B. Pant University of Agriculture and Technology, Nainital
- Goa College of Architecture, Goa
- Indian Institute of Technology, Delhi
- Jawaharlal Nehru Technological University, Hyderabad
- Jorhat Engineering College, Assam
- Madan Mohan Malviya Engineering College, Gorakhpur
- M.B.M Engineering College, Jodhpur
- M. S. University, Baroda
- Pilo Mody College of Architecture, Cuttack
- Regional Engineering College, Allahabad
- Regional Engineering College, Bhopal
- Regional Engineering College, Calicut
- Regional Engineering College, Durgapur
- Regional Engineering College, Kurukshetra
- Regional Engineering College, Silchar
- Regional Engineering College, Trichy
- Sri Venkateshwara University, Tirupati
- Thapar Institute of Engineering & Technology, Patiala

For further information feel free to contact us. Our address is:

Vishal Garg

Co ordinator

IT in Building Science

International Institute of Information Technology

(Formerly Indian Institute of Information Technology)

Deemed University

Gachibowli, Hyderabad 500 019, INDIA

Phone: +91-40-3001967, 69 Fax: +91-40-3001413 Email: info@cbs.iiit.net