

HERITAGE SCIENCE & TECHNOLOGY

Where Ancient Knowledge
Meets Modern Technology

M.Tech & Executive M.Tech Programs

ARCHAEOMETRY AND HERITAGE MATERIALS

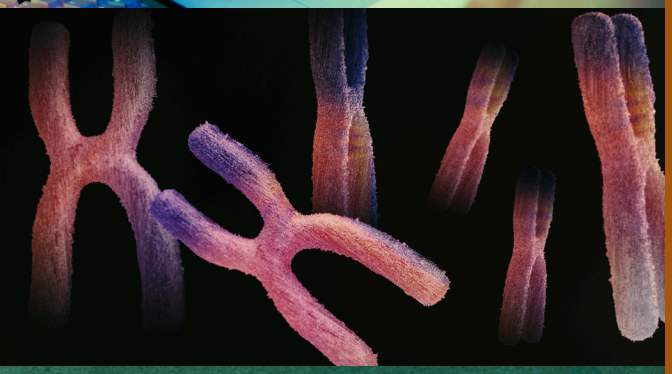
Curriculum Brochure

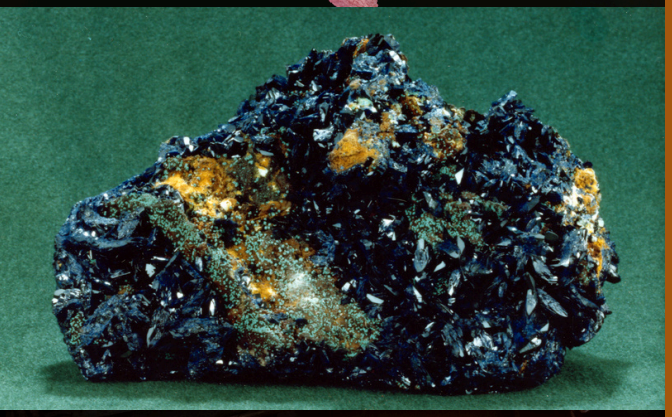
॥ नवोन्मेषेण देशनिर्माणम् ॥

భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad













M.Tech & Executive M.Tech Programs

CURRICULUM

ACADEMIC PROGRAMS

M.Tech in Heritage Science & Technology

Program Structure
• Duration: 2 Years • Total Credits: 48
• Coursework Credits: 24 • Thesis Credits: 24

Eligibility
• 4-Year Bachelor's Degree
OR
• 3-Year Bachelor's + 2-Year Master's Degree
(Engineering, Technology, Science, or Architecture backgrounds)
Approximate Fee ₹3.6 Lakhs*

Executive M.Tech in Heritage Science & Technology

Program Structure
• Duration: 1 Year
• Total Credits: 24
• Coursework-Centric Curriculum

Eligibility
• Any Bachelor's Degree
Approximate Fee ₹2.7 Lakhs*

Curriculum for Archaeometry and Heritage Materials (48 credits)			
Course code	Course name	Credits	Key Content Covered
Semester-1			
HT50000	Elements of Indian Heritage	2	Tangible and intangible heritage, Indic knowledge systems, literature taxonomy, and the use of concept maps/graphs to understand interconnected Indic terms.
HT50013	Introductory Mathematics for Engineers	2	Linear algebra, signal processing, probability, random variables, and intuitive data interpretation.
HT50033	Elementary Machine learning	2	Classification and regression, Bayes classifier, parametric/non-parametric methods, SVMs, Neural Networks, Deep Networks, and vision/language models.
HT50170	Techniques to unravel metallurgical and population histories of the world	2	Formation of mineral/ore deposits, Stone/Metal ages, history of copper/ferrous metallurgy (India/World), Radiocarbon dating, OSL, Lead/Strontium isotope analysis.
HT50140	Principles of Town Planning	2	Ancient planning principles, morphology of traditional habitats, historic case studies (Indus Valley, Gangetic Valley), urbanization, RS, and GIS tools.
HT50250	Chemistry for Archaeology	2	

Course code	Course name	Credits	Key Content Covered
Semester-2			
HT50230	Evolutionary and Preventive Medicinal Systems	1	
HT50260	Spectroscopy Techniques for Heritage Material Analysis	2	
HT50180	Genetics, Human Origins, Evolution and history of human population	2	DNA basics, early hominins, origin of modern Homo sapiens, modern admixtures, dispersals, Neanderthals, and Denisovans.
HT50123	Digital Visualization	2	Visual communication principles, applying recorded data in AR/VR/MR, gamification of cultural heritage, and application to platforms like the metaverse.
HT50160	Scripts of India	1	Manuscript and script fundamentals, origin/development of ancient Indic scripts (Brahmi, Kharoshti, Kutil), regional/neighboring scripts, and digital manuscript libraries.
	Electives from elective list below	5	
Semester-3			
HT50015	Thesis stage-1	12	
Semester-4			
HT50025	Thesis stage-2	12	

Electives			
Course code	Course name	Credits	Key Content Covered
HT50010	Control systems and human body	1	Fundamentals of control systems (open/closed loop, stability, feedback/feedforward, adaptive control), homeostasis, and physiological regulation examples.
HT50030	Brain & neuroscience	1	Brain and spinal cord anatomy, cognition, motor control, vision, audition, and somatosensation.
HT50020	Human anatomy & physiology	1	Musculoskeletal, cardiovascular, respiratory, and endocrine systems.
HT50040	Sāṃkhya	1	Sāṃkhya Kārikā of Īśvarakṛṣṇa, nature of the three Guṇas, sense/motor organs, primordial elements, Prakṛti, Mahat, Ahaṅkāra, Manas, Citta, and Buddhi
HT50043	Instrumentation for human electrophysiology	1	Sensing and measurement basics, bioelectricity (EEG, ECG, EMG), biophotonics, pulse oximetry, and body pressures/flows.
HT50080	Neuroimaging	1	Modalities, univariate/multivariate brain function models, graphical brain models, supervised/unsupervised learning (Neural Networks, SVMs), and clinical neuroscience applications.
HT50063	Automata & compilers	2	Principles of automata and formal languages, lexical analysis, parsing techniques (bottom-up/top-down), semantic analysis, type-checking, and abstract syntax trees.
HT50023	Introduction to software programming	1	Basic programming, object-oriented programming paradigms, and problem-solving using core data structures (linked lists, stacks, trees, graphs) primarily in Python.
HT50100	Paninian grammar	2	Indian cultural heritage foundations, Vyākaraṇam, Pāṇini's Aṣṭādhyāyī, Vārtikas, Mahābhāṣyam, Universals of Pāṇini, concept of Śabda, translation challenges, and Kārakam.

Course code	Course name	Credits	Key Content Covered
HT50110	Phonetics and Prosody in Indic heritage texts	1	Śikṣā (science of phonetics), roles of Varṇa, Svara, Mātrā, Balam; introduction to Chandas (prosody), preservation of mantras/ślokas, and major meter types.
HT50103	Defect mapping using Artificial Intelligence	2	Introduction to AI, inspection, condition assessment/diagnosis of material defects, vision-based defect inspection, and data analytics for cultural heritage.
HT50113	Digital Documentation of Heritage Structures	2	Heritage documentation standards, data recording methods, organizing/interpreting compiled data, photogrammetry, and LiDAR scanning.
HT50190	Building Materials in Heritage structures	2	Characterization and compatibility of materials, dating, defect assessment, carbon footprinting, remedial measures, and sustainability mapping.
HT50133	Design principles in Indian architecture	2	Conservation history/theory, world heritage criteria, architectural design principles, parametrics, historical architectural treatises (Sulba Sūtras, Mānasāra, Mayamata, Samarāṅgaṇasūtradhāra), and 3D script-modeling.
HT50050	Experimental design & statistics	1	Sources of scientific information, levels of information, experiment design structures, statistical techniques, and interpreting results.
HT50150	Risk Assessment of Heritage Structures	2	Heritage risk types, impact assessment, disaster management, mitigation strategies, and digital tracking tools (photogrammetry, crowdsourcing).
HT50200	Technology Applications in Built Heritage	1	Digital technologies in heritage conservation, digital sensors, direct/indirect survey tools, values frameworks, and preservation of digitally born information.
HT50073	Speech Technologies for Indian Languages with specific focus on Hindi, Tamil, Kannada & Telugu	2	Classic text/lexical processing techniques, speech recognition foundations, and multilingual speech processing with a specific focus on Hindi, Tamil, Kannada, and Telugu.

Course code	Course name	Credits	Key Content Covered
HT50090	Neuroscience of Yoga	2	Physiological correlates of yoga asana, prāṇāyāma, and dhyāna, evaluating recent neuroscientific studies and results.
HT50083	Text-to-Speech systems for Indian Languages	2	Recent advances in high-fidelity TTS synthesis systems, state-of-the-art models (FastPitch, HiFi-GAN), text processing nuances, and real-world media/service applications.
HT50093	NLP and information processing- Indian theories	2	Morphological analyzers/generators, tokenizers/segmenters for Sanskrit, sentential parsers based on verbal cognition theories, word sense disambiguation, and metrical analysis.
HT50120	Etymology in Indic heritage texts	1	Introduction to Nighaṇṭu (dictionary) and Niruktam (etymology) by Yāskācārya, and methodologies to interpret and decipher heritage texts.
HT50060	Foundations of Yoga	2	Pātañjala Yoga Sūtras (Aṣṭāṅga Yoga), Haṭha Yoga Pradīpikā (Asana, Mudra, Bandha), and Yoga Upaniṣads.
HT50070	Foundations of Ayurveda	1	History, divisions, Doṣa, Dhātu, circadian principles, relevance of Ayurveda, and its intersection with modern science.
HT50053	Human movement-Measurement and control	1	Biomechanics of the body, joints/muscles, electrophysiology, force tracking, EMG, EEG, force plates, motion capture, and computer vision.
HT50210	Heritage Building Information Modeling	1	Introduction to BIM, heritage metadata, 3D modeling tools, application of BIM in conservation, and cost estimation.
HT50220	Introduction to Siddha tradition of Indian medicine	1	History and fundamentals of Siddha medicine, epistemological highlights, diagnostic features, pharmacology, prominent texts, and modern interventions.

Online MTech in Heritage Science & Technology (2 years)
Online Executive MTech in Heritage Science & Technology (1 year)

ARCHEOMETRY & HERITAGE MATERIALS

- Archeo-chemistry
- Metallurgical histories
- Genetics and history of humans, scripts of india
- Town planning
- Evolutionary medicine
- Digital visualization

WHY IIT HYDERABAD?

IIT Hyderabad is built on a strong foundation of research, innovation, and interdisciplinary learning.
With world-class infrastructure, advanced research facilities, flexible academic programs, and a vibrant innovation ecosystem, the institute empowers students to translate ideas into impactful technologies and solutions for society.

CONNECT WITH US

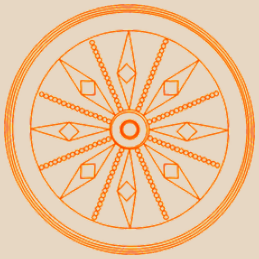
hst.iith.ac.in

admissions@hst.iith.ac.in
head@hst.iith.ac.in

@hstiithyderabad

Heritage Science & Technology
IIT Hyderabad

Department of Heritage Science & Technology
Indian Institute of Technology Hyderabad
Kandi, Sangareddy, Telangana 502285, India.



HERITAGE SCIENCE
& TECHNOLOGY