

Computer System Design - Systems Integration Approach

भारतीय प्रौद्योगिकी संस्थान तिरुपति
TIRUPATI



INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI

About IIT Tirupati:

The Indian Institute of Technology Tirupati (IIT Tirupati), established in 2015, is an autonomous Institute under the Ministry of Education, Government of India. It is declared as an Institute of National Importance under the Act of Parliament of India (Institutes of Technology Act, 1961). Indian Institute of Technology Tirupati is the first among the 3rd phase of IITs, announced in 2014, to have its foundation stone laid in March 2015. IIT Tirupati started functioning with the support of its mentoring institute, IIT Madras, from the academic year of 2015-16. The academic program was launched in August 2015 by admitting students in the B. Tech programme in the fields of Civil Engineering, Computer Science & Engineering, Electrical Engineering, and Mechanical Engineering. The research programmes namely, the MS and Ph.D. programmes have started from the academic year 2017. Subsequently, the new B. Tech programme in Chemical Engineering started in August 2018. The M. Tech programs in Mechanical, Electrical, and Computer Science disciplines have also been launched from August 2018. The M.Sc programme in Mathematics was started in August 2019. The curriculum for various programmes have an emphasis on theoretical knowledge and practice-oriented laboratories. Courses are well planned to nurture innovation, creativity, quality, teamwork, communication skills, ethics, and societal interaction.

Department of Computer Science and Engineering:

The Department of Computer Science and Engineering at IIT Tirupati has been involved in high-quality research right from the beginning. The graduate degree offered by the department gives great importance to fundamentals as well as state of the art technologies by offering courses such as Machine Learning, Deep Learning, Artificial Intelligence, etc. The faculty members of the department, whose interests cover a wide range of fields in Computer Science (broadly in the verticals of Systems, Theory and Data Science), constantly work towards providing better education while working at premier levels in their respective fields like Algorithmic Engineering, Big Data Technologies, Cloud Computing, Computer Architecture, Delay Tolerant Networks, Internet Of Things, Machine Learning, Parallel Computing, Software Engineering, etc. Courses in the curriculum cover basics to advanced levels in the topic and have been planned to nurture innovation, creativity, quality, teamwork, communication skills, ethics, and societal interaction.

Course Outline:

The main objective of this course is to design a simple general-purpose computer from the first principles. Typically, Computer Science and Engineering courses such as Computer Architecture, Operating Systems, Compilers, Algorithms, and Data-structures, Software engineering are typically taught independently. This course provides smooth coordination across these courses to design a general-purpose computer. The key focus is on designing the important components such as an arithmetic logic unit, control unit, memory unit, mini compiler, and operating system services. This course illustrates the beauty of computer science and engineering through various use cases: 1. Interactions between software and hardware. 2. Interfaces between compilers and operating systems, 3. Data-structures used in operating systems and compilers 4. Algorithms used in computer architecture, compilers and operating systems, and 5. Core principles of abstractions, modular design, and interfaces paradigm from software engineering.

Content:

1. Logic gates, Design of an arithmetic logic unit (ALU)
2. Flip-flops, Registers, Design of a Memory Unit
3. Assembly language (AL), Instruction set, programs in assembly language
4. Design of a central processing unit (CPU)
5. Assembler: Translation of assembly instructions to machine language
6. Compiler: Conversion from intermediate code to AL
7. Compiler: Conversion from a high level language to intermediate code
8. Operating system services

For Whom: The faculty members of the AICTE approved institutions, Research scholars, PG Scholars, participants from Government, Industry and staff of host institutions.

Program Duration: Online workshop from January 3rd 2022 to January 7th 2022. Three sessions each day, and each session is of 2 hours.

Session Plan:

Date\Time	10 am to 11 am	Session 1 11 am to 1 pm	Session 2 2 pm to 4 pm	Session 3 4 pm to 6 pm
Jan 3rd 2022	<i>Inaugural</i>	Design - ALU	Design - Memory Unit	Design - Custom Computer

Date\Time	Session 1 9 am to 11 am	Session 2 11 am to 1 pm	Session 3 2 pm to 4 pm
Jan 4th 2022	Von Neumann Architecture	Instruction set Architecture	Design - CPU
Jan 5th 2022	Assembler - Parsing	Assembler - Translation	Assembly Program. Lab
Jan 6th 2022	Compiler - Intermediate Code	Compiler - Code Generation	Compiler - Optimization
Jan 7th 2022	Operating System Services	Health and Happiness	Assessment Session

Programme Coordinator:

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How to enroll: Participants willing to participate should register on following portal - AICTE Training and Learning Academies (ATAL)
<https://atalacademy.aicte-india.org/signup>

E-Certification: Participants will receive digital certificate on successful completion of the programme.