


COMPUTER ARCHITECTURE AND ORGANIZATION

PROF. INDRANIL SENGUPTA

PROF. KAMALIKA DATTA

Department of Computer Science and Engineering
IIT Kharagpur

PRE-REQUISITES : Basic concepts in digital circuit design, familiarity with a programming language like C or C++

INTENDED AUDIENCE : Computer Science and Engineering / Information Technology / Electronics and Communication Engineering / Electrical Engineering

INDUSTRIES APPLICABLE TO : TCS, Wipro, CTS, Google, Microsoft, HP, Intel, Qualcomm

COURSE OUTLINE :

This course will discuss the basic concepts of computer architecture and organization that can help the participants to have a clear view as to how a computer system works. Examples and illustrations will be mostly based on a popular Reduced Instruction Set Computer (RISC) platform. Illustrative examples and illustrations will be provided to convey the concepts and challenges to the participants. Starting from the basics, the participants will be introduced to the state-of-the-art in this field.

ABOUT INSTRUCTOR :

Prof. Indranil Sengupta has obtained his B.Tech., M.Tech. and Ph.D. degrees in Computer Science and Engineering from the University of Calcutta. He joined the Indian Institute of Technology, Kharagpur, as a faculty member in 1988, in the Department of Computer Science and Engineering, where he is presently a full Professor. He had been the former Heads of the Department of Computer Science and Engineering and also the School of Information Technology of the Institute. He has over 28 years of teaching and research experience. He has guided 22 PhD students, and has more than 200 publications to his credit in international journals and conferences. His research interests include cryptography and network security, VLSI design and testing, and mobile computing. He is a Senior Member of IEEE. He had been the General Chairs of Asian Test Symposium (ATS-2005), International Conference on Cryptology in India (INDOCRYPT-2008), International Symposium on VLSI Design and Test (VDAT-2012), International Symposium on Electronic System Design (ISED-2012), and the upcoming Conference on reversible Computation (RC-2017). He had delivered invited and tutorial talks in several conferences in the areas of VLSI design and testing, and network security.

Prof. Kamalika Datta completed her B.Sc. (Computer Science) from Ravenshaw College, Cuttack, India in the year 2003, Master of Computer Application from Biju Pattanaik University of Technology, Bhubaneswar, India in the year 2006, and then Master of Science degree from Indian Institute of Technology, Kharagpur, India in 2010. She completed her Ph.D. from Indian Institute of Engineering Science and Technology, Shibpur, India. She has worked in industry and academia for almost 6 years. Currently she is a research fellow at Nanyang Technological University Singapore.

COURSE PLAN :

Week 1: Evolution of Computer Systems

Week 2: Instruction Set Architecture

Week 3: Quantitative Principles of Computer Design

Week 4: Control Unit Design

Week 5: Memory System Design

Week 6: Design of Cache Memory Systems

Week 7: Design of Arithmetic Unit

Week 8: Design of Arithmetic Unit (contd.)

Week 9: Input-Output System Design

Week 10: Input-Output System Design (contd.)

Week 11: Instruction Set Pipelining

Week 12: Parallel Processing Architectures