Autumn 2015-16: PC108 – Introduction to ICT and Computational Science (1-0-0-1)

The course aims to provide students with an overview of ICT and specific knowledge of selected aspects and applications of the discipline. It is designed to provide some historical perspective which is generally missing from the technical courses which students undergo during the first two years of the program.

Course Faculty: Prof. Nagaraj Ramrao, Prof. Anish Mathuria (coordinator), Prof. Ranendu Ghosh, Prof. Bhaskar Chaudhury. In addition, there will be a few guest lectures.

Lectures: Wednesdays, 12:00 noon, LT-3

Evaluation: Attendance is compulsory. There will be an end-sem exam.

Module 1 – Prof. Nagaraj R

- Semiconductor Devices: History of Electronics, Diodes, Transistors, MOS, SCR, IGBT etc
- Analog Circuits and Applications: Rectifiers, Controlled Rectifiers, Amplifiers, oscillators, Filters
- Digital Circuits and Applications: Boolean Algebra, Combinational circuits, Sequential circuits, Finite State machines

Module 2 – Prof. Mathuria

- Communication security issues: Confidentiality, Integrity, Authentication.
- Crypto functions and their security uses: Encryption; Message Authentication Codes (MAC); Digital signatures; public key certificates.
- Algorithms: RSA encryption; complexity.

Module 3 – Prof. Ghosh

- Introduction to ICT and Development;
- Use of satellite remote sensing for natural resources development;
- Role of satellite communication for development at village level;
- Use of MOOC technology for higher education.

Module 4 – Prof. Chaudhury

- Introduction to Computational Science: Applications and Scope, Present Status and Future Trends.
- Overview of Computational Science curriculum.
- Introduction to: Numerical methods; Modeling and Simulation; High Performance Computing; Data Analysis and Visualization.