

## **Approval: 6<sup>th</sup> Senate Meeting**

<b>Course Name</b>	: Socio-technical Systems Engineering
<b>Course Number</b>	: HS 508
<b>Credits</b>	: 2-1-0-3
<b>Prerequisites</b>	: none
<b>Intended for</b>	: B. Tech./M.S./Ph.D.
<b>Distribution</b>	: Elective
<b>Semester</b>	: odd/even

### ***Preamble:***

This course integrates with classical computer science and other engineering learning by providing a complementary socio technical perspective : the study of Socio-technical systems (STS) focuses on the interdependencies and interactions of technologies, with humans and their environment. Any technological system, to some extent, is a Socio-technical System when its intersections with humans and the environment are taken into account. Examples are: the internet (and its problems of security, privacy, and design), urban, regional and global transportation systems, regional and national power grids, telecommunication networks, the global financial system, environmental systems, national healthcare systems, cities and other large scale projects with significant societal impact. Today, a multitude of interconnected complex large scale technology intensive systems with large number of stakeholders, require technological and social complexity to be tackled in an integrated way. Socio-technical system are inherently evolutionary, as such they are deterministic, but not predictable, and therefore cannot be controlled. We can design organizations, but we cannot control how people will work together, how they will actually accomplish what they need to do. At another level, this means that we cannot control or strictly predict how people will construct goals, sources of information, or new tools. When we supply technology, we cannot predict all the nuances of how the tools might be exploited or how they might change the social interactions and roles.

### **Course Modules:**

***28 Lectures to cover the main topics (approx 2 Lectures per week)***

***14 Tutorials/workshops TOTAL: 3 hrs per week, plus assessment time as required***

- Introduction to systems science and engineering
- Principles of systems science
- Overview of systems engineering
- Lifecycle, and other system views
  
- Socio technical systems
- Background
- Evolution and key issues
- Overview of the state of the art
  
- Knowledge Systems, the Web

- The role of knowledge in STS (Knowledge representation, modelling)
  - Distributed /Intelligent systems design
  - Collective Intelligence and Social networks
- 
- Task Analysis
  - Traditional Task Decomposition
  - Knowledge/cognitive modelling of tasks
  - Cognitive walkthroughs
- 
- User centered design
  - Purpose and approaches
  - Tools and techniques
- 
- Human computer interaction
  - History of HCI
  - User Models
  - Interface Design
- 
- Interaction design
  - Fundamentals of interaction design
  - Types of interactions
  - Handling dynamic complexity
- 
- STS Requirements
  - Stakeholder analysis and management
  - Understanding social behaviors

**Textbooks:**

- Principles of Sociotechnical Design." Sociotechnical Systems: A Sourcebook, ed. William Pasmore and John Sherwood.
- Socio Technical Systems Engineering Handbook, Somerville et al Whitworth, Brian with Ahmad, Adnan (2013): SocioTechnical (available online)
- System Design. In: Soegaard, Mads with Dam, Rikke Friis (eds.). "The Encyclopedia of HumanComputer

Interaction, 2nd Ed.". Aarhus, Denmark: The Interaction Design Foundation. Available online at

[http://www.interactiondesign.org/encyclopedia/sociotechnical\\_system\\_design.html](http://www.interactiondesign.org/encyclopedia/sociotechnical_system_design.html)

**References:**

1 Stevens Institute of Technology

2 The Knowledge Level Reinterpreted: Modeling Socio Technical Systems William J. Clancey