

## Certificate Course Internet of Things (IoT): Modern Network Infrastructure

The certificate course **Internet of Things (IoT): Modern Network Infrastructure** provides an overview of and insights into modern network infrastructures, methods and approaches to design and evaluate these infrastructures, as well as an overview of techniques that are essential enablers of future IoT systems. A special focus is laid on particular techniques that allow distributed entities to communicate and interact efficiently in both cooperative and non-cooperative environments.

### Course Benefits & Take Away for Participants

The participants will

- learn about systems and technologies of modern computer networks and infrastructures;
- get an overview of technologies in mobile communication;
- learn about methods & approaches to design and evaluate future IoT systems in which distributed, heterogeneous and autonomous agents need to collaborate and coordinate their actions in order to achieve both individual and system-wide goals;
- will be able to situation-relatedly choose, rate design and apply these methods and systems.



### Overview Course Agenda

This certificate course focuses on modern network infrastructures, the basics of computer networks, mobile communication networks, technologies in the internet of things and methods and approaches to design and evaluation of complex collaborative multiagent systems. Topics of the agenda will be:

	Day 1	Day 2	Day 3
8 am - 1 pm	Lecture	Lecture	Lecture
	Lunch Break		
2 - 5:30 pm	Lecture	Excursion	Conclusion & Farewell (Exams optional)

- Brief introduction to network computing technologies
- Basics of network communication
- Different network infrastructures and their classification
- Basics of mobile communication networks
- Technologies in the IoT
- Design of IoT infrastructures
- Design & analysis of intelligent agents and multiagent systems
- Methods for communication & interaction in IoT systems
- Mechanisms for collaboration & coordination in cooperative and non-cooperative environments

Exemplary Schedule of a 3-day Certificate Course

## Agenda in Detail

Day 1	Day 2	Day 3
<p><b>Session 1: Introduction</b> Terminologies   Facts   History   Outlook on Evolving Nets</p> <p><b>Session 2 &amp; Exercise: Basic of Networks</b> Communication &amp; Data Communication   Model of (data/tele) communication   Distributed Applications   Protocols, Protocol Stack   Layer Model</p> <p><b>Session 3: Modern Networks</b> IPv4 vs IPv6   Voice-over-IP/ Video Telephony/ Web Conferences   Actual Protocols   Wireless Communication   The Dark Net</p> <p><b>Session 4: Mobile Communication &amp; Networks</b> GPRS and EDGE   UMTS and HSPA   Long Term Evolution (LTE) and LTE-Advanced</p>	<p><b>Session 1: Mobile Communication &amp; Networks II</b> Bluetooth   Near Field Communication   Next Generation Handover   Security in Modern Network Infrastructures</p> <p><b>Session 2 &amp; Exercise: Internet of Things</b> Challenges &amp; Opportunities   Exploring Major Architectural Aspects of the Web of Things   High-Level Internet of Things Applications</p> <p><b>Session 3: Multiagent Systems</b> From Distributed Systems to Multi-agent Systems   Introduction to Multi-agent Systems</p> <p><b>Session 4: Complex Adaptive Systems</b> Definition &amp; Overview   Introduction to Network Science   Emergence</p>	<p><b>Session 1: Agent-Based Modelling &amp; Simulation</b> Modelling Complex Systems   Agent-Based Modelling: Overview   Modelling Frameworks &amp; Programming Languages   The Modelling &amp; Simulation Lifecycle</p> <p><b>Session 2: Strategic Interaction</b> Motivation &amp; Introduction   Formalising Strategic Interactions: Introduction to Game Theory   Emergence of Cooperation   Trust &amp; Cooperation in Multi-agent Systems</p> <p><b>Session 3: Mechanism Design</b> Motivation   Truth-eliciting Interaction Protocols   Example: The Bitcoin Blockchain</p>

## Registration & Organizational Details

Duration	3 days
Prize	2.495 € per participant
Group Size	max. 15 participants
Certificate	Certificate of the HECTOR School of Engineering & Management, Technology Business School of the Karlsruhe Institute of Technology (KIT)
Registration	Register online via <a href="http://www.hectorschool.kit.edu/certificate_courses.php">www.hectorschool.kit.edu/certificate_courses.php</a>

### Admission Requirements:

- First University Degree (Bachelor, Diploma or equivalent)
- A minimum of 5 years of professional experience in the specific field of the course is recommended
- The course can be held in German or in English – appropriate skills in the respective language are required. For international companies translators can be hired.



For consultancy or company arrangements please contact:

### Program Consultancy

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