

ITMO 446 SYLLABUS

ITMO 446 Telecommunications over Data Networks

Hours: 3 credit hours / 45 contact hours

Instructor: Carol Davids

Textbook, title, author, and year: *SIP: Understanding the Session Initiation Protocol 3rd Edition*, Alan B. Johnston, 2009

Specific course information

- a. **Catalog description:** This course covers a suite of application protocols known as Voice over IP (VoIP). It covers key protocols within that suite, including Session Initiation Protocol (SIP), Real-time Transport Protocol (RTP) and Session Description Protocol (SDP) as well as the architectures of various VoIP installations including on-net to on-net; on-net to PSTN; and inter-domain scenarios. The functions of the Network Elements in these architectures are defined and examples of products that include these network elements are examined. Contrast with circuit-switched and web-based communications systems is provided.
- b. **Prerequisites:** ITMO 340.

Specific goals for the course

- a. **Course Outcome:** The goal of the course is to provide an understanding of how audio and video communications in real-time can be provided over Internet Protocol networks using protocols, including Session Initiation Protocol (SIP), Real-time Transport Protocol (RTP) and Session Description Protocol (SDP) defined by the Internet Engineering Task Force (IETF.) A further goal of this work is to provide an evolutionary perspective on the SIP-based approach contrasting circuit-switched communications and web-based approaches. This organization of the material is designed to foster innovative thinking and development in the field of real-time communications, based on hands-on work and an understanding of past innovation and development. The successful student will have the necessary knowledge and skills to work in the field of IP-based telecommunications at an entry level.
- b. **Course Student Outcomes:** Upon successful completion of the course the student should be able to:
 - Use protocol analysis tools to analyze the message flows between SIP functional elements.
 - Draw message sequence charts to aid in message flow analysis.

- Identify the header fields and parameters that may change as the messages traverse the network.
- Use this message flow analysis to verify correct behavior and to isolate trouble.
- Identify the media streams and signaling messages associated with a SIP call.
- Analyze contents of media streams and signaling messages associated with a SIP call.
- Perform tasks and demonstrate skills necessary to work in the field of IP-based telecommunications at an entry level.

Topics to be covered

- a. Protocol (SDP) and Real-time Transport Protocol (RTP)
- b. SIP functional elements and architecture
- c. SIP message syntax and call flows
- d. SIP relationships – transactions, dialogs and sessions
- e. Voice payload digitization
- f. Codecs
- g. Real-time Transport Protocol - RTP and RTCP
- h. Session Description protocol (SDP)
- i. SIP Methods
- j. SIP Feature Creation
- k. SIP Architectures
- l. Project presentations and demonstrations