

Title: Systems Theory and Systems Analysis.

Lecturer: Ass. prof. N.R.Bukharaev, CSc. in Math.

Term:

Lectures + Labs : 11+22 academic hours

ECTS credits:

FEL www:

Annotation:

This course focuses on the study of the fundamentals of systems theory and systems analysis, as well as acquiring the skills of modeling systems. The course examines the purpose of the models, types and levels of system modeling, classification, modeling techniques, characteristics and application of models to the analysis of systems, the basic procedures of systems analysis and the basics of building processes and information systems.

Prerequisites:

Competence requirements for students beginning their study of the course:

- Knowledge of the basic concepts of systems theory, properties and classification of systems, principles and laws of research and modeling systems, the structure of the system analysis , classification of different types of modeling systems, indicators and criteria of efficiency of system functioning
- Ability to use a systematic approach to the analysis of complex systems, to conduct functional , morphological and informational description of systems, to simulate different types of systems, to evaluate the efficiency of their functioning.
- Ability to use basic methods of system analysis

Course Objectives:

Students who have completed the study of this discipline have to

- understand the existing approaches to the analysis and creation of models of knowledge representation and processing , to modeling decision-making systems , to the methods of optimization and design decisions ;
- be able to apply the models of knowledge representation and processing , decision-making system , to use the methods of design optimization and decision -making;
- to master the skills of analysis, application and modeling knowledge representation and processing , decision support systems , the skills of optimization techniques and design decisions in specific situations.

Syllabus:

1. The basic concepts of systems theory and systems analysis.
2. Systems. Characteristics, regularities of functioning and development.
3. Fundamentals of systems analysis.
4. Methods and models.

Labs/Seminars:

1. Processing the results of experiments.
2. A study of cases of uncertainty.
3. Calculating statistic indicators of empirical array of data and graphical interpretation.
4. Modeling of discrete and continuous random variables.

5. One Way Analysis of variance (ANOVA).
6. A study of queuing systems.
7. Determination of similarity criteria describing processes in the systems studied using the theory of dimensions.

References:

The main textbooks

1. Дж. Ван Гиг. Прикладная общая теория систем. - М.: Мир, 1981.
2. Клир Дж. Системология. Автоматизация решения системных задач. - М.: Радио и связь, 1990.
3. Перегудов Ф.И., Тарасенко Ф.П. Введение в системный анализ: Уч. пособие. М.: Высшая школа, 1989.

Additional textbooks

4. Учебно-методический комплекс по дисциплине «Теория систем и системный анализ» для студентов направления 231000.68 «Программная инженерия». Составители: Воловач В. И., Мамедов А. – Поволжский университет сервиса, Тольятти 2012. УМК "Теория систем и системный анализ" <http://elib.tolgas.ru>