Course Summary
Course Title: MODELING AND PROGNOSIS OF ENVIRONMENTAL STATE
Credits: 7.5 (270 h.) and 0.5 credits of ECTS (18 h.) for Course Paper

Course objective
Acquirement of theoretical knowledge and practical skills in the field of modelling and prognosis of the environmental state.

Course tasks
Familiarization with models aimed to identify and forecast the state of objects and subjects of the environment, as well as with the methods of model construction and research which are necessary for decision-making activities on designing the ecologically clean enterprises and environmental management and planning the anthropogenic impact on the biosphere.

Course outlines
Introduction to the discipline. Model approach to environmental objects. The substance and principles of modeling. Classification of models and parameters of the environment. Linear models in ecology. Non-linear models and methods of their research. Discrete models of populations. Multivariate models. Optimization in non-linear models. Stochastic models. Regression model construction based on experimental or statistical data. Prognosis of the environmental state based on the analysis of time series. Models in the form of differential equations: demographic, "predator-prey". The system of biosphere dynamic process models General models of human activity and production. Modeling and prognosis of air, water and soil pollution transport.

Learning outcomes
After completing the course students should be able to:
- classify models;
- analyze mathematical models and determine the connection between the input and output variables;
- create the discrete models of populations and analyze their dynamics;
- analyze multivariate mathematical models;
- apply analytical methods of multivariate equation extremum seeking;
- analyze regression and simulation models;
- create regression models using experimental or statistical data;
- predict environmental indicators on the ground of analysis of time series;
- explore models in the form of differential equations;
- analyze components of demographic models;
- analyze models in the system "predator-prey";
- construct and analyze the models of dynamic processes of the biosphere, human activities and production; ,
- apply the models of the air, water and soil pollution transport.

Training activities: lectures, laboratory training sessions and term paper.

End-of-the-term assessment: examination.

Head of the Ecology Department,
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