



# Brest State Technical University

267 Moskovskaya Str., 224017 Brest, Republic of Belarus  
tel./fax: (375 162) 40-83-74, fax: (375 162) 42-21-27, e-mail: ttc@bstu.by, website: www.bstu.by

Course: Basis of Structural Design

Victor Tur, Prof., Dr. Sc. Ing.

Department of Concrete Technology and Building Materials

## **Scope:**

1. Introduction
2. Course objectives
3. Course duration
4. Prerequisites
5. Course content:
  - Topic 1: Basic statistical terms and techniques;
  - Topic 2: Basic requirements;
  - Topic 3: Reliability management;
  - Topic 4: Principles of limit state design;
  - Topic 5: Basic variables;
  - Topic 6: Structural analysis and design assisted by testing;
  - Topic 7: Verification by partial factors method;
  - Topic 8: Management of structural reliability for construction works
6. Course harmonogram.

## **1. Introduction**

The document provides a description of training course on the basis of structural design. The principal aim of this course is to prove the future engineer with the guidance on the interpretation and use of Eurocode: basis of structural design and also provides information on the implementation of the EC and their use with regard to National Annex (NDP).

## **2. Course objectives**

- 2.1. The objectives of Eurocodes and their status;
- 2.2. Technical objectives of ECO (EN1990);
- 2.3. Layout and organisation EN 1990;
- 2.4. National Annex for EN1990;
- 2.5. Practical experience of use.

## **3. Course duration: 32 hours**

Lectures - 32 hours

## **4. Prerequisites**

Knowledge of Methods of Structural Mechanics and Structural Design (Loading and Resistance Models), Statistics, Probabilistic Theory. The course exceeds the basic level and can be considered as intermediate.

## **5. Course content**

### **Topic 1: Basic statistical terms and techniques**

Populations and samples; sample characteristics and population parameters; probability distribution functions; statistical methods used in civil engineering; principles of estimation and tests; estimation of fractals.

### **Topic 2: Basic requirements**

Principal requirements; serviceability and ultimate limit states requirements; robustness requirements; buildings which have a roof with a large clear span, between supports.

### **Topic 3: Reliability management**

Basic concepts; choice of level of reliability; levels of reliability and classification; design working life; durability and probabilistic performance based durability design of concrete structures.

### **Topic 4: Principles of limit state design**

General; design situations; ultimate limit states; serviceability limit states; limit state design.

### Topic 5: Basic variables

Statistical Quantification of variables in limit state function; Actions and environmental influences; Material and product properties; Geometrical data; Modelling of material properties; Basic statistical techniques for determination of the characteristic value.

### Topic 6: Structural analysis and design assisted by testing

Structural modelling; static actions; dynamic actions; design assisted by testing.

### Topic 7: Verification by the partial factor method

Design values; limitations, ultimate limit states; verification of static equilibrium and resistance; combinations of actions; partial factors for actions and materials serviceability **limit** states; verification of serviceability; serviceability criteria.

### Topic 8: Management of structural reliability for construction works

Reliability differentiation; differentiation by B value; differentiation by measures relating to partial factors; design supervision differentiation; inspection during execution.

## **6. Course harmonogram (hours)**

<b>Topic</b>	<b>Lectures</b>	<b>Practical hours</b>	<b>Evaluation</b>
Topic 1	4	-	
Topic 2	4	-	
Topic 3	4	-	
Topic 4	4	-	
Topic 5	4	-	
Topic 6	4	-	
Topic 7	4	-	
Topic 8	4	-	
<b>Total</b>	<b>32</b>	<b>-</b>	<b>2</b>