Lecture 1.
PURPOSE AND OBJECTIVES OF THE COURSE

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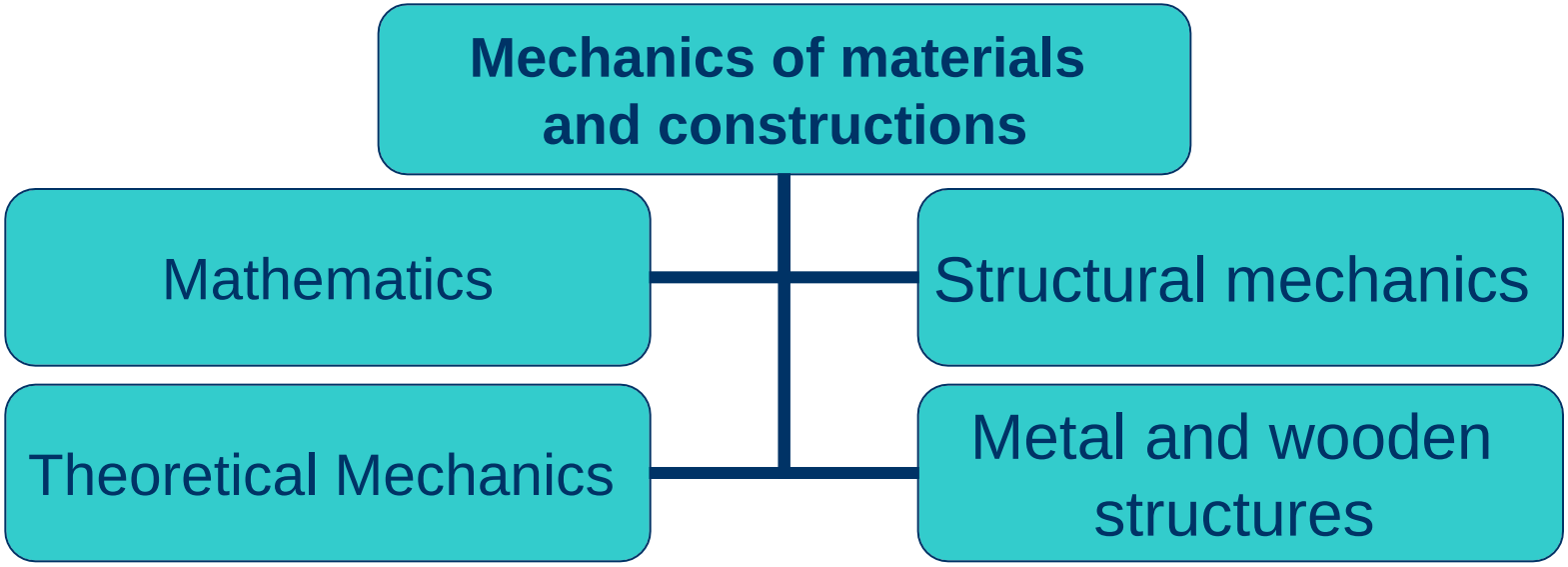
Plan of lecture

- 1. **Introduction to discipline „Mechanics of materials and constructions ”**
- 2. **Basic problem of the Mechanics of materials and constructions.**
- 3. **Main hypotheses of Strength of materials**

Introduction to discipline



Introduction to discipline

Bridge

House

Basic problem of the Mechanics of materials and constructions

The basic problem of the science is *development of engineering methods to design the structure elements applying the restraining conditions about the strength, stiffness and stability of the structure, when the definite durability as well as economy is given*.

Basic problem of the Mechanics of materials and constructions

Basic concepts

Strength is the ability of the structure to resist the influence of the external forces acting upon it.

Stiffness is the ability of the structure to resist the strains caused by the external forces acting upon it.

Durability is the property of the structure to save its strength, stiffness and stability during the exploitation time.

Main hypotheses of Strength of materials

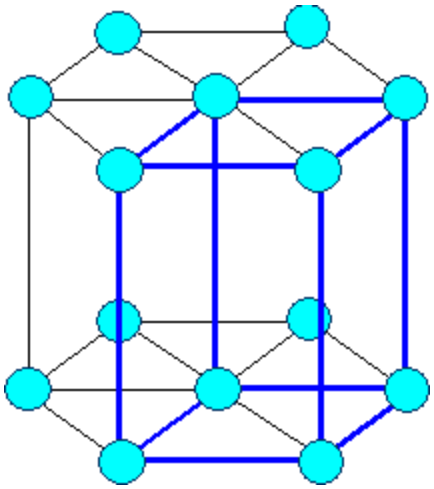
Rigid body – a body consisting of particles the distances between which do not change

Deformable body – a body consisting of particles the distances between which change. A deformable body is a rigid one only to the definite loading.

Main hypotheses of Strength of materials

1. Hypothesis of the material continuity

The material is uniformly distributed in a whole body volume



Main hypotheses of Strength of materials

2. Hypothesis of the material homogeneity
All points of the body have the same material properties

Homogeneous means that something is uniform throughout. Metals, alloys, ceramics are examples of homogeneous materials.

Main hypotheses of Strength of materials

3. Hypothesis of the material isotropy
The material properties are the same in each direction of a body

Isotropic means that the properties of materials are the same in all directions. If the grains of the material are not oriented uniformly in all directions, it is not an isotropic material.

Main hypotheses of Strength of materials

4. Hypothesis of the elasticity
Elasticity is the ability of the body to restore its initial shape and dimensions when the acting forces have been removed

5. Hypothesis of the deformability of the body
The deformations at each point are assumed to be small relative to the dimensions of construction

REFERENCES

- 1. Beer F.P., Johnston E.R., et. al.: Mechanics of materials. Graw – Hill. Inc., 2012. – 838 p
- 2. Sharma S.C.: Strength_of_materials. Web Course. http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IITROORKEE/ strength%20of%20materials /homepage.htm
- 3. Mechanics of materials: Theory and Problems. Manual. / A. Kutsenko, M. Bondar, V.Prishlyak – Kyiv. 2016 – 359 p.

Thank you!

Good bye!