C11 Design of structures from aluminium alloys, stainless steel, glass

1. week  **Aluminium structures**
Introduction, structural aluminium, materials selection, material properties for wrought aluminium and cast aluminium alloys, application: examples, cranes, ships, facades, scaffolds, approach according to Eurocode, references, educational programme TALAT.

2. week  **Design of aluminium elements**
HAZ softening adjacent to welds, classification of cross-sections, resistance of cross-sections, buckling resistance of members, serviceability limit states for buildings.

3. week  **Design of aluminium connections**
Basis of design, welded connections, heat-affected zone HAZ, connections made with bolts, rivets and pins, adhesive bonded connections, adhesives.

4. week  **Aluminium advanced design**
Analytical models for stress strain relationship, properties of cross sections with fillets and bulbs, behaviour of cross-sections beyond the elastic limit rotation capacity, torsional and torsional-flexural buckling.

5. week  **Stainless steel structures**
Trends in design, examples of structures, specialty of design.

6. week  **Stainless steel material and material properties**
Austenitic, duplex, ferritic, martensitic, precipitation hardened and lean steels. Designation, properties and use.

7. week  **Specialty in design of stainless steel structural elements**
Differences between design of elements from carbon and stainless steel, SLS, ULS, buckling of plates elements, tension, compression, shear, bending, lateral-torsional buckling, interactions.

8. week  **Connection design, erection and installation of stainless steel structures**
Mechanical connections, welding, connection material. Design and execution of connections. Methods of erections, tolerances, transportation, handling and storage, surface protection, cleaning, contact with other metals, flatness.

9. week  **Glass as a material for load bearing structures**
History, chemical composition, production, edge quality, material and mechanical properties, testing of the glass elements, float glass, toughened glass, heat strengthened glass, laminated glass, aesthetic coatings.

10. week  **Design of glass structures**
Design methods, load cases, compression – buckling of glass columns, bending - lateral and torsional stability of glass beam, hybrid beams, balustrades, staircases, curved glasses.

11. week: **Design of glass connection**
Type of connections, bolted connection – bearing bolts, friction bolts; glued connection – types of adhesive, mechanical properties of adhesives, strength of adhesive.

12. week: **Glass facades**
Glazing support attachments – spiders, variety of point fixing, support systems of facades, examples of glass structures.

13. week: **Reserve**

Seminars:
- Design of aluminium truss girder
- Design of aluminium welded beam
- Design of stainless steel column with welded I cross section.
- Design of glass columns
- Design of glass fin
- Design of hybrid steel-glass beam

References:
TALAT, URL: www.ea.net/eaa/education/TALAT
Design Manual for Structural Stainless Steel. Euro Inox and The Steel Construction Institute, 2006
Euro-Inox: http://www.euro-inox.org/