

## Course G1450: STRUCTURAL ANALYSIS

### GENERAL INFORMATION

Spring Semester  
6 ECTS credits

### INSTRUCTOR(S)

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### Description

The main objective of this course is to present both the conceptual analysis of structures and its computational approach based on matrix analysis and finite elements. Topics include: analysis of trusses; analysis of frames; virtual work and unit load method; basic concepts of structural stability; influence lines and introduction to the finite element method.

### TEXTBOOK

*Structural Analysis*. Russell C. Hibbeler. *Matrix Analysis of Structures*. Robert E. Sennet.

### SYLLABUS

1. Types of structures and loads
2. Introduction
3. Classification of Structures
4. Loads
5. Structural Design
6. 2. Trusses
7. Equilibrium equations
8. Classification of trusses: statically determinate, statically indeterminate and mechanism
9. Analysis of statically determinate trusses
10. Deflections using energy methods
11. Analysis of statically indeterminate trusses using energy methods
12. Structural stability. Buckling
13. 3. Frames
14. Frame-Member Stiffness Matrix
15. Frame-Member Global Stiffness Matrix
16. Application of the Stiffness Method for Frame Analysis
17. 4. Influence line for beams and frames
18. Introduction
19. Direct method
20. Maxwell's reciprocal theorem

21. Method of virtual work
22. Influence line for deflections
23. Influence line for reactions
24. Influence line for bending moments
25. Influence line for shear forces
26. 5. Matrix Analysis of Structures
27. Analysis of one-dimensional bars
28. Non-Nodal Forces and Thermal effects
29. Analysis of two-dimensional trusses
30. Analysis of two- dimensional frames
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