# Structures

- 1. Course number and name: 020STRGS4 Structures
- 2. Credits and contact hours: 6 ECTS credits, 3x1:15 contact hours
- 3. Name(s) of instructor(s) or course coordinator(s): Wassim Raphael Fouad Kaddah

### 4. Instructional Materials:

- **a.** Instructor class notes
- **b.** Traite de Genie Civil de l'Ecole polytechnique federale de Lausanne Volume 6: Analyse des structures et milieux continus ; Methode des elements finis ; Auteurs Francois Frey et Jaroslav Jirousek
- **c.** Modelisation de structures par elements finis Tome 2 : Poutres et plaques ; Auteurs : Gouri Dhatt et Jean Louis Battoz Hermes 1990
- d. Resistance des materiaux par la pratique, Tome 2 ; Jean Roux, Eyrolles 1995
- e. Calcul de structures, Jean Courbon, Dunod 1970
- **f.** Structural Analysis: A unified classical and matrix approach seventh edition; A Ghali, A. M. Neville, CRC Press Taylor & Francis Group 2017.
- **g.** Structural Analysis Fundamentals by Ramez Gayed and Amin Ghali, CRC Press Taylor & Francis Group 2022.

### 5. Specific course information

- a. Catalog description: Structural forms; influence lines; Rotations and Hardy-Cross Based Methods, Effect of temperature loads on structures, Analysis of Arches, Trusses, Continuous Beams, Plane Frames, Grids and spatial frames
- b. Prerequisites or co-requisites: 020RDMGS2 Strength of Materials
- c. Required: Required for all Civil Engineering students.

### 6. Educational objectives for the course

# a. Specific outcomes of instruction:

- Identify the effect of a moving load on structures
- Analyze structures with different methods
- Study the influence of temperature loads on structures
- Analyze different forms of structures such as arches
- Learn how to properly model plane and spatial structures composed of wire elements such that trusses, continuous beams, plane and spatial frames, arches, and grids
- Assimilate the numerical and computer implementation of the displacement method in order to create its own program
- Use commercial structural analysis software reliably and efficiently

### b. PI addressed by the course:

PI	1.1	1.2	1.3	1.4	6.3	6.4
Covered	Х	Х	Х	Х	Х	Х
Assessed						

#### 7. Brief list of topics to be covered:

- Introduction (1.25 hours)
- Structural forms; influence lines (5 hours)
- Rotations Based Method (7.5 hours)
- Hardy-Cross Based Method (7.5 hours)
- Effect of temperature loads on structures (5 hours)
- Analysis of Arches (1.25 hours)
- General introduction to the displacement method (2 hours)
- Plane and spatial trusses (4 hours)
- Continuous beams (2 hours)
- Plane frames (6 hours)
- Grids (3 hours)
- Spatial frames (2 hours)
- Elastic stability of plane frames (3 hours)
- Software Structural analysis (1 hour)