

Civil Engineering Section

Resilient steel structures laboratory

Prof. Alain Nussbaumer

Autumn semester M1/M3 Optional

AN 8.09.2024

CIVIL-526: STEEL STRUCTURES - Selected topics Autumn 2025

Teachers :

External: Olivier Burnier (OB)

RESSLab: Prof. Alain Nussbaumer (AN)

Assistant: NA

Week	Course	Teachers	Date	Mondays, classes 4.15pm - 6.00pm, MA A1 12		Exercises 6.00 pm - 7.00 pm MA A1 12
				Theme	Content	
37	1	AN	8.09	Introduction Part 1: Buildings	Course content and objectives. Organization of exercises and exams. Design of load-bearing systems and beams. Basis of design of steel-concrete composite beams (recall)	BAT 1: Reminders. Stabilization, bracing and building design
38	2	AN	15.09	Composite elements	Design & calculation of beams and studs (full connection), elastic & plastic.	BAT 2: Check of a composite beam BAT 3 Composite, full connection
39	2	AN	22.09	No course	Lundi du jeûne	
40	3	AN	29.09	Visit of Steel construction company	Entreprise Morand SA. Bus leaving at 15:30, returning at 19h	
41	4	AN	6.10		Partial connection. Introducing composite slabs.	BAT 4 Composite check, partial connection
42	5	AN	13.10	Composite (end)	Design and calculation of a composite column.	BAT 5 Calculation of a composite column
43			20.10	Vacations		
44	6	OB	27.10	Fire	Bases, requirements, new legislation Steel and fire protection (including intumescent paints)	FIRE 1 Fire protection design of a building
45	8	OB	3.11		Calculation method in accordance with ISO fire standards Fire resistance of beams and columns. Nomogram, SZS tables and MACS+ software	FIRE 2 Check of steel columns and beams against normative fire
46	9	OB	10.11		Membrane forces in composite slabs (and FRACOF software) Natural fire calculation	Assignment 1 FIRE 3 Fire check of composite slabs
47	10	AN	17.11	Part 2: Bridges, Fatigue/Fracture	Introduction, structures involved: bridges, crane supp. structures, masts, etc. Fatigue resistance: basics, parameters, propagation, service life, S-N curve. Main components of a bridge, functions.	FAT 1 S-N curve

48	11	AN	24.11		Introduction to fracture mechanics Quality assurance.	FAT 2 Calculation of the critical size of a crack
49	12	AN	1.12	<i>Will be a 3h course with an interactive exercise</i>	Standardised European resistance curves, classification of construction details (incl. <i>interactive exercise</i>) Principles of verification. Fatigue stress, histogram.	<i>Interactive exercise</i> And distribution assignment 2 (by groups) FAT 3 Search for a case of fatigue/fracture and explain it
50	13	AN	8.12		Cumulative damage. Discussion FAT 1 case of fatigue fracture	FAT 4 Cumulative damage calculation
51		AN	15.12		Simplified "lambda" normative method, or method of equivalent damage.	FAT 5: use of lambda method
		AN	12.01-31.01.26	Written Exam	3-hour written exam, date to be set by the SAC	