Civil Engineering Section
Resilient steel structures laboratory **Prof. Alain Nussbaumer**
Autumn semester M1/M3 Optional AN 8.09.2024

CIVIL-526: METAL STRUCTURES - Selected chapters
Autumn 2024

Teachers :
External: Olivier Burnier (OB)
RESSLab: Prof. Alain Nussbaumer (AN)
Assistant: NA

Week	Course	Teachers	Date	Mondays, classes 4.15pm - 6.00pm, GC C3 30		Exercises 6.00 pm - 7.00 pm GC C3 30
				Theme	**Content**	
37	1	AN	9.09	**Introduction** **Part 1: Buildings**	Course content and objectives. Organisation of exercises and tests. Design of load-bearing systems and beams. Design and calculation of composite beams	BAT 1: Reminders. Stabilisation, bracing and building design
38	2	AN	16.09	**No course**	Lundi du jeûne	
39	2	AN	23.09		Design and calculation of composite beams (continued)	BAT 2: Check of a composite beam
40	3	AN	30.09	**Composite elements**	Design & calculation elastic plastic connection, full connection.	BAT 3 Composite check, full connection
41	4	AN	7.10		Partial connection. Introducing composite slabs.	BAT 4 Composite check, partial connection
42	5	AN	14.10	**Composite (end)**	Design and calculation of a composite column.	BAT 5 Calculation of a composite column
43			21.10	**Vacations**		
44	6	OB	28.10	**Fire**	Bases, requirements, new legislation Steel and fire protection (including intumescent paints)	FIRE 1 Fire protection design of a building
45	8	OB	4.11		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	11.11		Membrane forces in composite slabs (and FRACOF software) Natural fire calculation	FIRE 3 Fire check of composite slabs
47	10	AN	18.11	**Part 2: Bridges, Fatigue/breakdown**	Introduction, structures involved: bridges, crane supp. structures, masts, etc. Fatigue resistance: basics, parameters, propagation, service life. Main components of a bridge, functions.	FAT 1 (by group) Search for a case of fatigue/fracture and explain it.

48	11	AN	25.11		Introduction to fracture mechanics Quality assurance.	FAT 2 Calculation of the critical size of a crack
49	12	AN	2.12		Standardised resistance curves, classification of construction details, Principles of verification. Fatigue stress, histogram.	FAT 3: Classification of various details
50	13	AN	9.12		Cumulative damage. Discussion FAT 1 case of fatigue fracture	FAT 4 Cumulative damage calculation
51		AN	16.12		Simplified "lambda" normative method, or method of equivalent damage.	FAT 5: use of lambda method
		AN	13.01-1.02.25	**Examen**	**3-hour written exam, date to be set by the SAC**	