ENSCL SYLLABUS 2022-2023

Date updated: 07.03.2022

Year 1	Semester 5												
Teaching Units	**Modules**	**Code**	**CM**	**TD**	**TP**	**PR**	**TEA**	**Total (H)**		**Coeff**	**ECTS**	**Professor responsible**	**Language[1]**	**Academic level[4]**
5.1 Analytical Chemistry	Electrochemistry in Solution and Electrochemical methods	C5.1.1	20,0	20,0				40,0	74,0	3,5	7	C Pirovano	F	B
	Experimental and analytical chemistry	C5.1.2			34,0			34,0		3,5			F	B
5.2 Spectroscopy and organic chemistry	Structure and reactivity of organic molecules	C5.2.1	17,3	12,0				29,3	62,7	2	5	E. Buisine	F	B
	Applied molecular spectroscopy	C5.2.2	20,0	13,3				33,3		3			F	B
5.3 Physical Chemistry	Thermochemistry (In class + self-study)	C5.3.1	16,0	12,0				28,0	66,5	2	7	L. Thuinet	F	B
	Kinetics (In class + self-study)	C5.3.2	12,0	4,0				16,0		2			F	B
	Experimental physical chemistry	C5.3.3			22,5			22,5		3			F	B
5.4 Chemical Engineering - 1	Fluid mechanics and hydrodynamics	C5.4.1	10,7	4,0				14,7	45,7	1,5	4	N. Fatah	F	B
	Heat and exchange transfers	C5.4.2	12,0	4,0				16,0		1,5			F	B
	Experimental chemical engineering	C5.4.3			15,0			15,0		1			F	B
5.5 Languages - 1	LV 1 – English	C5.5.1		30,0				30,0	60,0	2	4	A. Benaïssa		B
	LV 2 - German	C5.5.2		30,0				30,0		2				B
	LV 2 - Spanish	C5.5.3		30,0				30,0		2				B
	French as a foreign language	C5.5.4		25,0				25,0		2				B
	Optional: 3rd language	C5.5.5		30,0				30,0		*				B
5.6 Job training, Humanities	3P[2] / Sustainable development	C5.6.1				12,0		12,0	54,6	0,75	3	C. Dujardin	F/E	B
	Project management	C5.6.2	4,0				13,3	17,3		1			F	B
	Applied statistics and data processing	C5.6.3	12	13,3				25,3		1,25			F	B
TOTAL S5								**363,5**		**30,0**	**30,0**			

Year 1	Semester 6											
Teaching Units	**Modules**	**Code**	**CM**	**TD**	**TP**	**PR**	**Total (H)**	**Coeff**	**ECTS**	**Professor responsible**	**Language**[1]	**Academic level** [4]
6.1 **Organic and macromolecular Chemistry**	Advanced organic chemistry	C6.1.1	20,0	12,0			32,0	3		G. Fontaine	F	B
	Organometallic chemistry	C6.1.2	8,0	4,0			12,0	1			F	B
	Introduction to polymer chemistry	C6.1.3	8,0	4,0			12,0	1	8		F	B
	Experimental Organic chemistry	C6.1.4			36,0		36,0	3			F	B
6.2 **Inorganic chemistry**	Solid state chemistry	C6.2.1	10,6	10,7			21,3	1,5		M. Rivenet	F	B
	Crystal chemistry	C6.2.2	8	12			20,0	1,5			F/E	B
	Inorganic and industrial chemistry	C6.2.3	24	2,7			26,7	1,5	8		F/E	B
	Experimental inorganic chemistry	C6.2.4			40,0		40,0	3,5			F	B
6.3 **Chemical Engineering - 2**	Mass transfers and exchanges	C6.3.1	12,0	4,0			16,0	1	2	N. Fatah	F	B
	Processes of separation and drying	C6.3.2	8,0	5,3			13,3	1			F	B
6.4 **Languages - 2**	LV 1 - English	C6.4.1		30,0			30,0	2		B. Winkler		B
	LV 2 - German	C6.4.2		30,0			30,0	2				B
	LV 2 -Spanish	C6.4.3		30,0			30,0	2	4			B
	French as a foreign language	C6.4.4		25,0			25,0	2				B
	Optional: 3rd language	C6.4.5		30,0			30,0	*				B
6.5 **Job training, Humanities**	3P[2]	C6.5.1				10,0	10,0	0,75		C. Dujardin	F	B
	Financial aspects of an enterprise - Business game (accountancy)	C6.5.2	4,0	13,3			17,3	1,25	4		F	B
	Digital tools for engineers	C6.5.3	2,7	9,3			12	1			F	B
	Sustainable development	C6.5.4	12				12	1			F/E	B
6.6 **Industrial Internship**	Industrial Internship (6 weeks)[3]	C6.6.1							4	C. Becquart	F	B

TOTAL S6		340,60	30,0	30,0
TOTAL 1A (S5+S6)		**704,1**		**60**

(1): F/E: The course can be given in French or in English according to the audience (2): Professional project, seminars, visits of industrial places
(3): 4 ECTS validated by the internship supervisor (4): B : Bachel

Year 2		Semester 7										
Teaching Units		Modules	Code	CM	TD	TP	PR	Total (H)	Coeff	ECTS	Professor responsible	Language[1]	Academic level[6]
7.1	Organic chemistry	Heterocyclic chemistry	C7.1.1	8,0	4,0			12,0	1			F	M
		Homogeneous catalysis	C7.1.2	6,7	2,7			9,3	0,75			F	M
		Heteroelements chemistry	C7.1.3	6,7	4,0			10,7	0,75	5	P. Cotelle	F	M
		Applied molecular spectroscopy	C7.1.4	6,0	16,0			22,0	1,5			F	M
		Analysis methods (NMR, HPLC, GC-MS[2]	C7.1.5			12,5		12,5	1			F	M
7.2	Formulation	Introduction to Formulation Chemistry	C7.2.1	4,0				4,0	-			F	M
		Chemical Specialties for Formulation	C7.2.2	4,0	4,0			8,0	1			F	M
		Formulation physical chemistry	C7.2.3	4,0	4,0			8,0	1	4	J.M. Aubry	F	M
		Polymers formulation	C7.2.4	8				8,0	1			F	M
		Introduction to Data Science in Formulation	C7.2.5	2,7				2,7	-			F	M
		Experimental Designs	C7.2.6	10,6	6,7			17,3	1			F/E	M
7.3	Materials Science	Main classes of materials	C7.3.1	20,0				20,0	-			F	M
		Mechanical analyses	C7.3.2	12,0				12,0	1			F	M
		Analysis of the solids	C7.3.3	14,7	4			18,7	2	5	J.-B. Vogt	F	M
		Methods of analysis: (X fluorescence, X diffraction, MEB/hardness)	C7.3.4			12,0		12,0	2			F	M
7.4	Industrial and sustainable Chemistry	Green chemistry	C7.4.1	9,3	2,7			12	1,25			F	M
		Industrial catalysis	C7.4.2	8,0	4,0			12,0	1			F	M
		Heterogeneous catalysis and industrial applications	C7.4.3	6,7	4,0			10,7	1	5	S. Duquesne	F	M
		Life cycle analysis	C7.4.4	4,0	6,7			10,7	1			F	M
		Eco Design of materials and processes	C7.4.5	4,0	1,3			5,3	0,75			F	M
7.5	Languages	LV 1 – English	C7.5.1		30,0			30,0	2				M
		LV 2 - German	C7.5.2		30,0			30,0	2				M
		LV 2 - Spanish	C7.5.3		30,0			30,0	2	4	H. Larabi		M
		French as a foreign language	C7.5.4		25,0			25,0	2				M
		Optional: 3rd language	C7.5.5		30,0			30,0	*				M
7.6	Sustainable development	Sustainable development[3]	C7.6.1				8[3]	8,0	0,5			F	M
		Toxicology	C7.6.2	12,0				12,0	1	2	G. Fontaine	F	M
		Security[2]	C7.6.3			7,0		7,0	0,5			F	M
7.7	Job training, Humanities	3P[4]	C7.7.1				10,0	10,0	0,5			F	M
		Problem solving tools and methodology	C7.7.2	2,0	8,0			10	0,5			F	M
		Industrial property	C7.7.3	8,0				8,0	-	5	C. Dujardin	F	M
		Numerical modeling	C7.7.4	2,7	9,3			12	1			F	M
		Literature Research[5]	C7.7.5	1,3			10	11,3	2			F	M
		Written and oral communication (1st year's internship)	C7.7.6						1			F	M

TOTAL S7						366,2	30,0	30,0	

Year 2	Semester 8											
Teaching Units	**Modules**	**Code**	**CM**	**TD**	**TP**	**PR**	**Total (H)**	**Coeff**	**ECTS**	**Professor responsible**	**Language[1]**	**Academic level[6]**
8.1 **Chemical Engineering**	Multi component distillation + liquid- liquid extraction	C8.1.1	9,3	5,3			14,6	1,0	4	F. Dhainaut	F	M
	Aspen	C8.1.2		6,7			6,7	1,0			F	M
	Reactors	C8.1.3	8,0	12,0			20,0	1,0			F	M
	Experimental chemical engineering	C8.1.4			15,0		15,0	56,3	1,0			F	M
8.2 **Polymers**	Physico chemistry of polymers	C8.2.1	12,0				12,0	1,0		P. Woisel	F	M
	Polymers chemistry	C8.2.2	16,0	8,0			24,0	61,0	1,5			F	M
	Experimental polymers chemistry	C8.2.3			25,0		25,0	1,5	4		F	M

Major A : Sustainable Chemistry and Processes for the Industry							121,3		8	Professor responsible: S. Duquesne		
8.3.A **Molecular and macromolecular chemistry**	Natural compounds and carbohydrate chemistry	C8.3.A.1	20,0				20,0	1,25		S. Duquesne	F/E	M
	Functional polymers	C8.3.A.2	6,7				6,7	60,0	0,5	4		F	M
	Natural macromolecules	C8.3.A.3	9,3				9,3	0,75			F	M
	Organic matter valorisation	C8.3.A.4			24,0		24,0	1,5			F	M
8.4.A **Processes and bioprocesses**	Recycling and treatment of industrial waste	C8.4.A.1	16,0				16,0	1,0		C. Dujardin	F	M
	Heterogeneous reactors	C8.4.A.2	8,0	4,0			12,0	0,75			F	M
	Introduction to microbiology	C8.4.A.3	8,0				8,0	61,3	0,50			F	M
	Enzymatic catalysis	C8.4.A.4	6,7	2,6			9,3	0,75	4		F	M
	Principle and Concept of Bio- refineries – Catalytic Transformation	C8.4.A.5	16,0				16,0	1,0			F	M

Major B : Formulation Chemistry and Applications							117,3		8	Professor responsible: C. Pierlot		
8.3.B **Chemical specialties**	Chemistry of lipids	C8.3.B.1	8,0		4,0		12,0	1		C. Pierlot	F	M
	Eco-design of surfactants	C8.3.B.2	5,3	2,7			8,0				F/E	M
	Carbohydrate chemistry	C8.3.B.3	5,3	2,7			8,0	58,7	0,5	4		F/E	M
	Pigments, dyes and colorimetry	C8.3.B.4	8,0	2,7			10,7	1,0			F/E	M
	Functional Polymers	C8.3.B.5	16,0	4,0			20,0	1,5			F/E	M
8.4.B **Formulation Design**	Solvents and solubility	C8.4.B.1	9,3	4,0			13,3	1,0		J.-M. Aubry	F	M
	Formulation of surfactants and dispersed systems	C8.4.B.2	9,3	4,0			13,3	1,0			F	M
	Design of formulated products	C8.4.B.3	8,0	4,0			12,0	1,0			F	M
	Seminars (chemical specialties, Formulation)	C8.4.B.4	4,0				4,0	58,6	-	4		F	M
	Formulation & chemical physics (experimental)	C8.4.B.5			16,0		16,0	1,0			F	M

	Course	Code					Total		ECTS		Professor	(1)	(6)
Major C: Optimisation and Reliability of Materials								120,0		8	**Professor responsible: J.-B.**		
8.3.C Use properties	Corrosion	C8.3.C.1	16,0				16,0		1		JB Vogt	F/E	M
	Physics of polymeric materials	C8.3.C.2	12,0				12,0	44,0	1			F/E	M
	Plasticity – Rupture	C8.3.C.3	16,0				16,0		1	3		F/E	M
8.4.C Materials	Catalytic materials	C8.4.C.1	16,0				16,0	76,0	1	5	J Bouquerel	F	M
	Metallurgy	C8.4.C.2	16,0				16,0		1			F/E	M
	Functional materials for energy	C8.4.C.3	12,0				12,0		0,5			F/E	M
	Glass-ceramics	C8.4.C.4	12,0				12,0		1			F	M
	Experimental metallurgy	C8.4.C.5			20,0		20,0		1,5			F/E	M

Common Core Classes

	Course	Code					Total		ECTS		Professor	(1)	(6)
8.5 Languages	LV 1 - English	C8.5.1		30,0			30,0		2	4	M. Fian		M
	LV 2 - German	C8.5.2		30,0			30,0		2				M
	LV 2 -Spanish	C8.5.3		30,0			30,0	60,0	2				M
	French as a foreign language	C8.5.4		25,0			25,0		2				M
	Optional: 3rd language	C8.5.5		30,0			30,0		*				M
8.6 Job training, Humanities	Sustainable development (3)	C8.6.1				8	8		1		C. Dujardin	F	M
	Price management	C8.6.2	8,0	12,0			20,0	100,0	1	5		F	M
	Law	C8.6.3	12,0				12,0		1			F	M
	Project: "Development of materials or compounds with functional aim"(4)	C8.6.4				60,0	60,0		2			F	M
8.7 Internship	Industrial internship with responsibilities (8 weeks)(5)	C8.7.1							5	5	C. Becquart	F	M

TOTAL S8	SCPI	**398,7**	30	**30**
	FCA	**394,7**	30	**30**
	ORM	**397,3**	30	**30**

TOTAL Year 2 (S7+S8)	SCPI	**764,9**	30	**60**
	FCA	**760,9**	30	**60**
	ORM	**763,5**	30	**60**

(1): F/E: The course can be given in French or in English according to the audience (2): Practical work "Industrial Chemistry: analysis methods and security
(3): MOOC Sustainable Development
(4): Project: "Development of materials or compounds with functional aim"
(5): 5 ECTS validated by the internship supervisor
(6): M: Master level

Year 3	Semester 9											
Teaching Units	**Modules**	**Code**	**CM¹**	**TD¹**	**TP¹**	**PR¹**	**Total (H)**	**Coeff**	**ECTS**	**Professor responsible**	**Language**	**Academic level⁽²⁾**
Major A : Sustainable Chemistry and Processes for the Industry								223	16	16			
9.1.A Sustainable Resources	Polymers and biosourced composites.	C9.1.A.1	14,0				14,0	60,0	1,0	4	F. Samyn	F	M
	Recycling of polymer materials	C9.1.A.2	12,0		4,0		16,0		1,0			F	M
	Bioenergies	C9.1.A.3	14,0	6,0		4,0	24,0		1,5			F	M
	Rare earths and metals recovery.	C9.3.A.4	6,0				6,0		0,5			F/E	M
9.2.A Clean processes	Bioprocesses	C9.2.A.1	12,0	4,0	8,0		24,0	54,0	1,5	4	C. Dujardin	F/E	M
	Reactors engineering - Future Reactors / Clean Technologies	C9.2.A.2	8,0	4,0			12,0		1			F	M
	Modeling of engineering processes	C9.2.A.3	4,0	6,0			10,0		1			F/E	M
	Green polymer processes	C9.2.A.4	4,0		4,0		8,0		0,5			F/E	M
9.3.A Environment	Treatment of gases	C9.3.A.1	20,0				20,0	49,0	1,50	4	S. Duquesne	F	M
	Water treatment	C9.3.A.2	16,0				16,0		1,25			F	M
	Contaminated Soils treatment	C9.3.A.3	8,0				8,0		0,75			F	M
	Analytical techniques associated with the environment	C9.3.A.4	5,0				5,0		0,5			F	M
9.4.A Experimental practice	Interdisciplinary Scientific Project	C9.4.A.1			50,0	6,0	56,0	60,0	3,0	4	S. Duquesne	F	M
	Advanced life cycle analysis.	C9.4.A.2		4,0			4,0		1			F	M
Major B : Formulation Chemistry and Applications								222	16,0	16	Professor responsible: J.-M. Aubry		
9.1.B Formulation: Physical-chemistry, Colloids and Dispers sistems	Colloids: Physical-chemistry and industrial applications	C9.1.B.1	10,0	5,0			15,0	69,0	1,5	5	J.-M. Aubry	F	M
	Microemulsions: Formulation with the HLD method)	C9.1.B.2	10,0	5,0			15,0		1,5			F	M
	Emulsions: Elaboration and characterization	C9.1.B.3	10,0	5,0			15,0		1,5			F/E	M
	Formulation & Processes (experimental)	C9.1.B.4			24,0		24,0		0,5			F	M
9.2.B Methodology, tools and	Experimental design of mixtures	C9.2.B.1	8,0	2,0			10,0		1		C. Pierlot	F	M
	Advanced experimental designs and principal component analysis	C9.2.B.2	5,0	5,0			10,0		1			F/E	M

		Course	Code					Total	Group	ECTS	Grp	Responsible		
Advanced techniques for Formulation		Rheological agents	C9.2.B.3	6,0				6,0		0,5			F	M
		Paints and varnishes formulation	C9.2.B.4	10,0				10,0	45,0	0,5	4		F/E	M
		Polymers in formulation - experimentation	C9.2.B.5			4,0		4,0		0,5			F	M
		Conferences	C9.2.B.6	5,0				5,0					F	M
9.3.B	**Formulation Processes**	Complex fluids rheology	C9.3.B.1	10,0				10,0	44,0	1	4	N. Fatah	F	M
		Engineering of mixtures	C9.3.B.2	10,0				10,0		1			F	M
		Powder technology	C9.3.B.3	10,0		9,0		19,0		2			F	M
		Conferences	C9.3.B.5	5,0				5,0		-			F	M
9.4.B	**Experimental practices**	Disperse systems advanced characterization techniques (RMN, ZETA, DLS…)	C9.4.B.1			16,0		16,0	64,0	1	4	J.-M. Aubry	F/E	M
		Scientific project	C9.4.B.2			28,0	20,0	48,0		3			F	M
Major C: Optimisation and Reliability of Materials									220	16,0	16	**Professor responsible: J.-B. Vogt**		
9.1.C	**Materials' behaviour**	Damage and reliability of materials	C9.1.C.1	20,0				20,0	34,0	1,5		J.-B. Vogt	F/E	M
		End-of-life materials	C9.1.C.2	14,0				14,0		1,5	3		F	M
9.2.C	**The "material solutions"**	Metallic and multimaterial alloys	C9.2.C.1	20,0				20,0		2			F/E	M
		Powders technologies and methods for shaping solids.	C9.2.C.2	20,0				20,0		2		C. Becquart	F	M
		Surface treatments	C9.2.C.3	20,0				20,0	80,0	1	6		F/E	M
		Cement Matrices	C9.2.C.4	10,0				10,0		0,5			F	M
		Polymers	C9.2.C.5	10,0				10,0		0,5			F/E	M
9.3.C	**Investigation methods**	Numerical tools of materials selection	C9.3.C.1	4,0	4,0			8,0		1			F/E	M
		Practical use of finite elements method	C9.3.C.2	6,0	14,0			20,0	50,0	1,5	3	J. Bouquerel	F/E	M
		Advanced analysis techniques.	C9.3.C.3	14,0	8,0			22,0		0,5			F	M
9.4.C	**Project**	Interdisciplinary Scientific Project	C9.4.C.1			50,0	6,0	56,0	56,0	4	4	J.-B. Vogt	F/E	M
Common Core Classes														
9.5	**Modern Foreign Languages**	LV 1 - English	C9.5.1		30,0			30,0	60,0	2				M
		LV 2 - German	C9.5.2		30,0			30,0		2				M
		LV 2 -Spanish	C9.5.3		30,0			30,0		2	4	A. Guégand		M
		French as a foreign language	C9.5.4		25,0			25,0		2				M
		Optional: 3rd language	C9.5.5		30,0			30,0		*				M
Business & Responsible Management									122,5	10	10			
9.6	**Quality, Hygiene and Security**	Sustainable development, carbon footprint	C9.6.1				16[2]	16		0,75		S. Bourbigot	F	M
		Industrial security	C9.6.2	20,0				20,0	51,0	1,0	3		F	M
		Toxicology	C9.6.3	10,0				10,0		0,75			F	M
		Interdisciplinary Health & Safety Project	C9.6.4				5,0	5,0		0,5			F	M
9.7	**Economics & Management**	Business simulation project	C9.7.1	4,0	12,0			16,0	21,5	0,5	2	C. Dujardin	F/E	M
		Interdisciplinary Project in economy	C9.7.2		4,0		1,5	5,5		1,5			F	M
		Legal environment and life of a corporation	C9.8.1	12,0				12,0	50,0	1,0	5		F	M
		Strategic and operational marketing	C9.8.2	18,0				18,0		1,5			F	M

9.8	Enterprise	Production management	C9.8.3	14,0		14,0		0,75			F/E*	M
		Innovation & Creativity Workshop	C9.8.4	6,0		12,0		0,75			F	M
		Written communication (2nd year internship report)	C9.8.5					1,0		C. Becquart	F	M

TOTAL S9			
SCPI	405,5	30,0	30
FCA	404,5	30,0	30
ORM	402,5	30,0	30

(1): Number of hours: CM (Teaching hours); TD (Tutorial); TP (Practical work); PR (Projects)
* Bonus
F/E : The course can be given in French or in English according to the audience
* Only the MOOC course is available online in English (2): Carbon Footprint Project

Year 4		Semester 10									
Teaching Units		Modules	Code	CM[1]	TD[1]	TP[1]	PR[1]	Total (H)	Coeff	ECTS	Professor responsible	Language
10.1	Placement	Internship: Final year project (6 months)*	C10.1.1						30	30	C. Becquart	

TOTAL S10				30

(*): 30 ECTS validated by the internship supervisor

TOTAL 3A (S9+S10)		hrs	coeff	ECTS
	SCPI	405,5	60	60
	FCA	404,5	60	60
	ORM	402,5	60	60

TOTAL ENGINEERING CYCLE Year 1 + Year 2 + Year 3		hrs	coeff	ECTS
	SCPI	1874,5		180
	FCA	1869,5		180
	ORM	1870,1		180