ENSCL SYLLABUS 2019-2020

Date updated: 13.11.2019

Year 3	Semester 5

Teaching Units		Modules	Code	CM	TD	TP	PR	Total (H)		Coeff	ECTS	Professor responsible	Language[1]	Academic level[4]
5.1	Analytical Chemistry	Electrochemistry in Solution and Electrochemical methods	5.1.1	20,0	20,0			40,0	74,0	3,5	7	C Pirovano	F	B
		Experimental and analytical chemistry	5.1.2			34,0		34,0		3,5			F	B
5.2	Spectroscopy and organic chemistry	Structure and reactivity of organic molecules	5.2.1	17,3	12,0			29,3	63,3	2	5	E. Buisine	F	B
		Applied molecular spectroscopy	5.2.2	20,0	14,0			34,0		3			F	B
5.3	Physical Chemistry	Thermochemistry (In class + self-study)	5.3.1	16,0	12,0			28,0	66,5	2	7	L. Thuinet	F	B
		Kinetics (In class + self-study)	5.3.2	12,0	4,0			16,0		2			F	B
		Experimental physical chemistry	5.3.3			22,5		22,5		3			F	B
5.4	Chemical Engineering - 1	Fluid mechanics and hydrodynamics	5.4.1	10,7	4,0			14,7	45,7	1,5	4	N. Fatah	F	B
		Heat and exchange transfers	5.4.2	12,0	4,0			16,0		1,5			F	B
		Experimental chemical engineering	5.4.3			15,0		15,0		1			F	B
5.5	Languages - 1	LV 1 - English	5.5.1		30,0			30,0	60,0	2	4	A. Benaïssa		B
		LV 2 - German	5.5.2		30,0			30,0		2				B
		LV 2 -Spanish	5.5.3		30,0			30,0		2				B
		French as a foreign language	5.5.4		25,0			25,0		2				B
		Optional: 3rd language	5.5.5		30,0			30,0		*				B
5.6	Job training, Humanities	3P[2] / Sustainable development	5.6.1				12,0	12,0	41,3	0,75	3	C. Dujardin	F/E	B
		Project management	5.6.2	4,0				4,0		0,75			F	B
		Applied statistics and data processing	5.6.3	12	13,3			25,3		1,5			F	B
TOTAL S5								**350,8**		**30,0**	**30,0**			

ENSCL SYLLABUS 2019-2020

Year 3	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	6.1.1	20,0	12,0			32,0	92	3	8	G. Fontaine	F	B
		Organometallic chemistry	6.1.2	8,0	4,0			12,0		1			F	B
		Introduction to polymer chemistry	6.1.3	8,0	4,0			12,0		1			F	B
		Experimental Organic chemistry	6.1.4			36,0		36,0		3			F	B
6.2	Inorganic chemistry	Introduction to solid state chemistry	6.2.1	16,0	6,0			22,0	108,7	1,5	8	M. Rivenet	F	B
		Crystal chemistry	6.2.2	13,3	6,0			20,0		1,5			F/E	B
		Inorganic and industrial chemistry	6.2.3	26,7				26,7		1,5			F/E	B
		Experimental inorganic chemistry	6.2.4			40,0		40,0		3,5			F	B
6.3	Chemical Engineering - 2	Mass transfers and exchanges	6.3.1	12,0	4,0			16,0	30,0	1	2	N. Fatah	F	B
		Processes of separation and drying	6.3.2	8,0	6,0			14,0		1			F	B
6.4	Languages - 2	LV 1 - English	6.4.1		30,0			30,0	60,0	2	4	B. Winkler		B
		LV 2 - German	6.4.2		30,0			30,0		2				B
		LV 2 -Spanish	6.4.3		30,0			30,0		2				B
		French as a foreign language	6.4.4		25,0			25,0		2				B
		Optional: 3rd language	6.4.5		30,0			30,0		*				B
6.5	Job training, Humanities	3P[2]	6.5.1				10,0	10,0	60,0	0,5	4	C. Dujardin	F	B
		Financial aspects of a company - Business game (accountancy)	6.5.2	4,0	14,0			18,0		1,25			F	B
		Digital tools for engineers	6.5.3	2,7	9,3			12		0,75			F	B
		Sustainable development	6.5.4	12			8[4]	20		1,5			F/E	B
6.6	Industrial Internship	Industrial Internship (6 weeks)[3]	6.6.1								4	C. Becquart	F	B

TOTAL S6	**350,7**	**30,0**	**30,0**
TOTAL 1A (S5+S6)	**701,5**		**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 : Bachelor

ENSCL SYLLABUS 2019-2020

Year 4	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	7.1.1	8,0	4,0			12,0	65,9	1	6	P. Cotelle	F	M
	Homogeneous catalysis	7.1.2	6,7	2,0			8,7		1			F	M
	Heteroelements chemistry	7.1.3	6,7	4,0			10,7		1			F	M
	Applied molecular spectroscopy	7.1.4	16,0	6,0			22,0		2			F	M
	Analysis methods (NMR, HPLC, GC-MS)[2]	7.1.5			12,5		12,5		1			F	M
7.2 Formulation	Formulation physical chemistry	7.2.1	16,0				16,0	48,0	1,5	4	J.M. Aubry	F	M
	Polymers formulation	7.2.2	8,0				8,0		0;5			F	M
	Experimental Designs	7.2.3	16,0	8,0			24,0		2			F/E	M
7.3 Materials Science	Main classes of materials	7.3.1	20,0				20,0	62,7		5	J.-B. Vogt	F	M
	Mechanical analyses	7.3.2	12,0				12,0		1			F	M
	Analysis of the solids	7.3.3	18,7				18,7		2			F	M
	Methods of analysis: (X fluorescence, X diffraction, MEB/hardness)	7.3.4			12,0		12,0		2			F	M
7.4 Sustainable Chemistry	Introduction to green chemistry	7.4.1	12,0				12,0	50,7	1,25	5	S. Duquesne	F	M
	Industrial catalysis	7.4.2	12,0				12,0		1			F	M
	Heterogeneous catalysis and industrial applications	7.4.3	6,7	4,0			10,7		1			F	M
	Life cycle analysis	7.4.4	4,0	6,0			10,0		1			F	M
	Eco Design of materials and processes	7.4.5	4,0	2,0			6,0		1			F	M
7.5 Languages	LV 1 - English	7.5.1		30,0			30,0	60,0	2	4	H. Larabi		M
	LV 2 - German	7.5.2		30,0			30,0		2				M
	LV 2 - Spanish	7.5.3		30,0			30,0		2				M
	French as a foreign language	7.5.4		25,0			25,0		2				M
	Optional: 3rd language	7.5.5		30,0			30,0		*				M
7.6 Sustainable development	Sustainable development[3]	7.6.1				8[3]	8,0	27,0	0,5	2	G. Fontaine	F	M
	Toxicology	7.6.2	12,0				12,0		1			F	M
	Security[2]	7.6.3			7,0		7,0		0,5			F	M
7.7 Job training, Humanities	3P[4]	7.7.1				10,0	10,0	46,3	0,5	4	C. Dujardin	F	M
	Problem solving tools and methodology	7.7.2	2,0	8,0			10,0		0,5			F	M
	Industrial property	7.7.3	8,0				8,0					F	M
	Numerical modeling	7.7.4	2,7	9,3			12		1			F	M
	Literature research[5]	7.7.5	1,3			5,0	6,3		1			F	M
	Written and oral communication (1st year's internship)	7.7.6							1			F	M
TOTAL S7							**360,6**		**30,0**	**30,0**			

ENSCL SYLLABUS 2019-2020

Year 4	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	8.1.1	9,3	5,3			14,6		1,0			F	M
		Aspen	8.1.2		6,7			6,7		1,0		F. Dhainaut	F	M
		Reactors	8.1.3	8,0	12,0			20,0	56,3	1,0	4		F	M
		Experimental chemical engineering	8.1.4			15,0		15,0		1,0			F	M
8.2	Polymers	Physico chemistry of polymers	8.2.1	12,0				12,0		1,0			F	M
		Polymers chemistry	8.2.2	16,0	8,0			24,0		1,5	4	P. Woisel	F	M
		Experimental polymers chemistry	8.2.3			25,0		25,0	61,0	1,5			F	M
Option A : Chemistry, Biomass and Environment									**121,3**		**8**	**Professor responsible: S. Duquesne**		
8.3.A	Molecular and macromolecular chemistry	Natural compounds and carbohydrate chemistry	8.3.A.1	20,0				20,0		1,25			F/E	M
		Functional polymers	8.3.A.2	6,0				6,0		0,5	4	S. Duquesne	F	M
		Natural macromolecules	8.3.A.3	10,0				10,0		0,75			F	M
		Organic matter valorisation	8.3.A.4			24,0		24,0	60,0	1,5			F	M
8.4.A	Processes and bioprocesses	Recycling and treatment of industrial waste	8.4.A.1	16,0				16,0		1,0			F	M
		Heterogeneous reactors	8.4.A.2	8,0	4,0			12,0		0,75			F	M
		Introduction to microbiology	8.4.A.3	8,0				8,0		0,50	4	C. Dujardin	F	M
		Enzymatic catalysis	8.4.A.4	6,7	2,6			9,3		0,75			F	M
		Principle and Concept of Bio-refineries – Catalytic Transformation	8.4.A.5	16,0				16,0	61,3	1,0			F	M
Option B : Chemical specialties and Formulation									**114,0**		**8**	**Professor responsible: C. Pierlot**		
8.3.B	Chemical specialties	Chemistry of lipids	8.3.B.1	8,0				8,0		0,5			F	M
		Carbohydrate chemistry	8.3.B.2	8,0				8,0		0,5			F/E	M
		Eco-design of surfactants	8.3.B.3	8,0				8,0	56,0	0,5	4	C. Pierlot	F/E	M
		Pigments, dyes and colorimetry	8.3.B.4	12,0				12,0		1,0			F/E	M
		Functional Polymers	8.3.B.5	20,0				20,0		1,5			F/E	M
8.4.B	Formulation design	Solvents and solubility	8.4.B.1	9,0	4,0			13,0		1,0			F	M
		Formulation of surfactants and dispersed systems	8.4.B.2	9,0	4,0			13,0		1,0			F	M
		Design of formulated products	8.4.B.3	8,0	4,0			12,0		1,0		J.-M. Aubry	F	M
		Seminars (chemical specialties, Formulation)	8.4.B.4	4,0				4,0	58,0		4		F	M
		Experimental formulation chemistry	8.4.B.5			16,0		16,0		1,0			F	M
Option C : Materials									**120,0**		**8**	**Professor responsible: J.-B. Vogt**		
		Corrosion	8.3.C.1	16,0				16,0		1		JB Vogt	F/E	M

8.3.C	**Use properties**	Physics of polymeric materials	8.3.C.2	12,0				12,0	44,0	1	3		F/E	M
		Plasticity – Rupture	8.3.C.3	16,0				16,0		1			F/E	M
8.4.C	**Materials**	Catalytic materials	8.4.C.1	16,0				16,0	76,0	1	5	J Bouquerel	F	M
		Metallurgy	8.4.C.2	16,0				16,0		1			F/E	M
		Functional materials for energy	8.4.C.3	8,0				8,0		0,5			F/E	M
		Glass-ceramics	8.4.C.4	16,0				16,0		1			F	M
		Experimental metallurgy	8.4.C.5			20,0		20,0		1,5			F/E	M
Class together														
8.5	**Languages**	LV 1 - English	8.5.1		30,0			30,0	60,0	2	4	M. Fian		M
		LV 2 - German	8.5.2		30,0			30,0		2				M
		LV 2 -Spanish	8.5.3		30,0			30,0		2				M
		French as a foreign language	8.5.4		25,0			25,0		2				M
		Optional: 3rd language	8.5.5		30,0			30,0		*				M
8.6	**Job training, Humanities**	Sustainable development (3)	8.6.1				8	8	100,0	1	5	C. Dujardin	F	M
		Price management	8.6.2	8,0	12,0			20,0		1			F	M
		Law	8.6.3	12,0				12,0		1			F	M
		Project: “Elaboration of materials or compounds with functional aim”[4]	8.6.4				60,0	60,0		2			F	M
8.7	**Internship**	Industrial internship with responsibilities (8 weeks)[5]	8.7.1							5	5	C. Becquart	F	M

TOTAL S8	CBE	**398,6**	30	**30**
	Form	**391,3**	30	**30**
	Matx	**397,3**	30	**30**

TOTAL 2A (S7+S8)	CBE	**759,2**		**60**
	Form	**751,9**		**60**
	Matx	**757,9**		**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): Professional project, seminars, visits of industrial places
(4): Project: "Elaboration of materials or compounds with functional aim"
(5): 5 ECTS validated by the internship supervisor
(6): M: Master level

ENSCL SYLLABUS 2019-2020

Year 4	Semester 9

Teaching Units		Modules	Code	CM[1]	TD[1]	TP[1]	PR[1]	Total (H)		Coeff	ECTS	Professor responsible	Language	Academic level[(2)]
Option A : Chemistry, Biomass and Environment									**221**	**15**	**15**			
9.1.A	**Chemistry of biomass**	Polymers and biosourced composites.	9.1.A.1	14,0		4,0		14,0	56,0	1,0	4	F. Samyn	F	M
		Recycling of polymer materials.	9.1.A.2	12,0				16,0		1,0			F	M
		Bioenergies	9.1.A.3	20,0				20,0		1,5			F	M
		Rare earths and metals recovery.	9.3.A.4	6,0				6,0		0,5			F/E	M
9.2.A	**Clean processes**	Bioprocesses	9.2.A.1	20,0				20,0	56,0	1,5	4	C. Dujardin	F/E	M
		White biotechnologies	9.2.A.2	6,0				6,0		0,25			F/E	M
		Reactors engineering - Future Reactors / Clean Technologies	9.2.A.3	8,0	4,0			12,0		0,75			F	M
		Modeling of engineering processes	9.2.A.4	4,0	6,0			10,0		0,75			F/E	M
		Green polymer processes	9.2.A.5	4,0		4,0		8,0		0,75			F/E	M
9.3.A	**Environment**	Treatment of gases	9.3.A.1	20,0				20,0	49,0	1,50	4	S. Duquesne	F	M
		Water treatment	9.3.A.2	16,0				16,0		1,25			F	M
		Contaminated Soils treatment	9.3.A.3	8,0				8,0		0,75			F	M
		Analytical techniques associated with the environment	9.3.A.4	5,0				5,0		0,5			F	M
9.4.A	**Experimental practice**	Scientific cross interdisciplinary project	9.4.A.1			50,0	6,0	56,0	60,0	2,5	3	S. Duquesne	F	M
		Advanced life cycle analysis.	9.4.A.2		4,0			4,0		0,5			F	M

Option B : Chemical specialties and Formulation									224	15,0	15	Professor responsible: J.-M. Aubry		
9.1.B	**Formulation physical chemistry**	Colloïds (physical-chemistry and industrial applications)	9.1.B.1	26,0				26,0	70,0	2,0	5	J.-M. Aubry	F	M
		Surfactants (physical-chemistry and functional properties)	9.1.B.2	5,0				5,0		0,5			F	M
		Microemulsions (Formulation with the HLD method)	9.1.B.3	5,0				5,0		0,5			F	M
		Emulsions (formulation, preparing method and characterisation)	9.1.B.4	10,0				10,0		1,0			F/E	M
		Experimental colloidal physico chemistry-	9.1.B.5			24,0		24,0		1,0			F	M
9.2.B	**Strategies in formulation et**	Experimental design of mixtures	9.2.B.1	10,0				10,0		1		C. Pierlot	F	M
		Advanced experimental designs and principal component analysis	9.2.B.2	5,0	5,0			10,0		0,5			F/E	M

	coatings	Rheological agents	9.2.B.3	6,0				6,0		0,5			F	M
		Paints and varnishes formulation	9.2.B.4	10,0				10,0	45,0	0,5	3		F/E	M
		Polymers in formulation - experimentation.	9.2.B.5			9,0		9,0		0,5			F	M
9.3.B	**Formulation Process**	Complex fluids rheology	9.3.B.1	10,0				10,0		1			F	M
		Engineering of mixtures	9.3.B.2	10,0				10,0		1			F	M
		Powder technology	9.3.B.3	10,0		9,0		19,0	53,0	2		N. Fatah	F	M
		Conferences (detergents, cosmetics, silicones, sensorial analysis; microfluidics)	9.3.B.4	14,0				14,0		-	4		F	M
9.4.B	**Transversal project**	Advanced experimental formulation chemistry	9.4.B.1			16,0		16,0	56,0	0,5	3	J.-M. Aubry	F/E	M
		Scientific transversal project	9.4.B.2				40,0	40,0		2,5			F	M

Option C : Materials									220	15,0	15	**Professor responsible: J.-B. Vogt**		
9.1.C	**Materials' behaviour**	Damage and reliability of materials	9.1.C.1	20,0				20,0		1,5		J.-B. Vogt	F/E	M
		End of life materials	9.1.C.2	14,0				14,0	34,0	1,5	3		F	M
9.2.C	**The "material solution"**	Metallic and multimaterial alloys	9.2.C.1	20,0				20,0		2		C. Becquart	F/E	M
		Powders technologies and methods for shaping solids.	9.2.C.2	20,0				20,0		2			F	M
		Surface treatments	9.2.C.3	20,0				20,0		1			F/E	M
		Glasses	9.2.C.4	10,0				10,0	80,0	0,5	6		F	M
		Polymers	9.2.C.5	10,0				10,0		0,5			F/E	M
9.3.C	**Investigation methods**	Numerical tools of materials selection	9.3.C.1	4,0	4,0			8,0		1			F/E	M
		Practical use of finite elements method	9.3.C.2	6,0	14,0			20,0	50,0	1,5	3	J. Bouquerel	F/E	M
		Advanced analysis techniques.	9.3.C.3	14,0	8,0			22,0		0,5			F	M
9.4.C	**Project**	Scientific cross interdisciplinary project	9.4.C.1			50,0	6,0	56,0	56,0	3	3	J.-B. Vogt	F/E	M
Class together														
9.5	**Languages**	LV 1 - English	9.5.1		30,0			30,0	60,0	2	4	A. Guégand		M
		LV 2 - German	9.5.2		30,0			30,0		2				M
		LV 2 -Spanish	9.5.3		30,0			30,0		2				M
		French as a foreign language	9.5.4		25,0			25,0		2				M
		Optional: 3rd language	9.5.5		30,0			30,0		*				M
Entreprise et Management Responsable									**130,5**		**11**			
9.6	**Quality, Hygiene and Security**	Sustainable development	9.6.1				16[(2)]	16		0,75		S. Bourbigot	F	M
		Industrial security	9.6.2	20,0				20,0		1,0			F	M
		Toxicology	9.6.3	10,0				10,0	51,0	0,75	3		F	M
		Cross interdisciplinary project in security	9.6.4				5,0	5,0		0,5			F	M
9.7	**Economy, Management**	Business simulation project	9.7.1	4,0	12,0			16,0	21,5	0,5	2	C. Dujardin	F/E	M
		Cross interdisciplinary project in economy	9.7.2		4,0		1,5	5,5		1,5			F	M
9.8	**Company**	Legal environment and company life.	9.8.1	12,0				12,0		1,0		C. **Becquart**	F	M
		Project management	9.8.2	8,0				8,0		1,0			F/E	M
		Strategic and operational marketing	9.8.3	18,0				18,0		1,5			F	M
		Production management	9.8.4		8,0			8,0		0,5			F/E*	M
		Management – integration into a company	9.8.5		12,0			12,0	58,0	1,0	6		F	M
		Written communication (2nd year internship report)	9.8.6							1,0			F	M

TOTAL S9	CBE	**411,5**	30,0	**30**
	Form	**414,5**	30,0	**30**
	Matx	**410,5**	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): M: Master level

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 month)*	10.1.1							30	**30**	C. Becquart	

TOTALS10				**30**

(*): 30 ECTS validated by the internship supervisor

		h	**coeff**	**ECTS**
TOTAL 3A (S9+S10)	CPDI	**411,5**	**60**	**60**
	Form	**414,5**	**60**	**60**
	Matx	**410,5**	**60**	**60**

TOTAL ENGENEERING CYCLE (1A+2A+3A)	CPDI	**1872,2**		**180**
	Form	**1867,9**		**180**
	Matx	**1869,9**		**180**