

Teaching program

Génie des Procédés et Bio-Procédés

Academic year 2019-2020

Ecole polytechnique de l'université de Nantes

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Part I

Tables of teaching units

Semester 5 - unit *GPB 3*

Mathematics and programming

ECTS : 6

Manager : COTONNEC Annaig

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Programming and algorithmics	20		20			17	3
• Applied mathematics	12.5		20			20	3
TOTAL	32.5	0	40	0	0	37	

Biology-microbiology

ECTS : 7

Manager : GRIZEAU Dominique

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Biology basics	19.5		20			8	3.5
• Biological engineering	27		20			8	3.5
TOTAL	46.5	0	40	0	0	16	

Process engineering basis

ECTS : 9

Manager : COGNE Guillaume

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Methods and concepts in (bio)process engineering	12	12				12	3
• Energetics	14	15				15	2.25
• Phenomena of distribution	7.5	7.5				5	1.5
• Thermodynamics	14	15				15	2.25
TOTAL	47.5	49.5	0	0	0	47	

Humanités 1

ECTS : 8

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Grammar and professional English 1		40					1
• Working Law		10.5				10.5	0.1
• Economy		21				10.5	0.2
• Sport 1		19.5				2	0.2
• Epistemology and methods of technical culture		15				15	0.15
• Professional project 1 : Introduction				7.5		1.5	1
TOTAL	0	106	0	7.5	0	39.5	

Accueil différencié

Manager : COTONNEC Annaig

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Introduction to biology and biochemistry or Support of mathematics			15			9	0
TOTAL	0	0	15	0	0	9	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	126.5	155.5	95	7.5	0	148.5	30
Face-to-face sum	384.5						

Semester 6 - unit *GPB 3*

Humanités 2

ECTS : 8

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Grammar, Toeic and professional English 2		39	2				1
• Creativity		7.5				7.5	0.05
• Discovery of firms, professions and entrepreneurship	2	10.5				10.5	0.125
• Sustainable development		10.5				10.5	0.125
• Sport 2		19.5				2	0.15
• Opening courses 1	10.5					10.5	0.1
• Management tools		10.5				5	0.1
TOTAL	12.5	97.5	2	0	0	46	

Unit operations

ECTS : 6

Manager : *MARCHAL Luc*

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Absorption	12	8				8	1.5
• Stirring and mixing	8					2	1
• Extraction and purification	12	8				8	1.5
• Practical teaching in unit operations			24			5	2
TOTAL	32	16	24	0	0	23	

Transfer and transport phenomena

ECTS : 8

Manager : *SI-AHMED El-Khider*

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Fluid mechanics	28	24	8			24	4.5
• Heat transfert	19	13.5				13.5	2
• Mass transfer	9.5	9.5				9.5	1.5
TOTAL	56.5	47	8	0	0	47	

Chemistry/analytical chemistry

ECTS : 8

Manager : *GONCALVES Olivier*

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Industrial chemistry	12	12				6	1.5
• Introduction to chromatography	8	8	16			5	2
• Microbiology and catalysis	12	12				6	1.5
• Kinetics and thermochemistry	16	16	16			16	3
TOTAL	48	48	32	0	0	33	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	149	208.5	66	0	0	149	30
Face-to-face sum	423.5						

Semester 7 - unit *GPB 4*

Chemical Reaction Engineering

ECTS : 7

Manager : *GENTRIC Caroline*

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Systemic analysis	12	14				9	3
• Homogeneous reactors - Part I	12	14.5	8	4		9	3
• Homogeneous reactors - Part II	12	14.5	8	4		9	3
TOTAL	36	43	16	8	0	27	

Data Acquisition and Analysis

ECTS : 8

Manager : *TITICA Mariana*

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Worksheets and Databases	8	1.5	12			8	1
• Sensors and Process Control	24	1	12	12		20	3
• Statistics and Probability	10	12				11	2
• Technical and Engineering Processes	12	10				8	1
TOTAL	54	24.5	24	12	0	47	

Advanced fluid mechanics and thermal processes

ECTS : 7

Manager : *SI-AHMED El-Khider*

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Heat Exchangers	3	1	4				0.5
• Non-Newtonian Fluids Flow	3	5				3	1
• Flow in Porous Media	11	14	8			18	1.5
• Processes with Phase Change	4	9.5	8			4	2
• Rheology	5	5	4			5	0.5
• Turbulence	8	8	4			11	1.5
TOTAL	34	42.5	28	0	0	41	

Humanités 3**ECTS : 8**

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Professional English 3		19	2				3
• Continuous Assessment (bis)							1
• French as a Foreign Language for engineering students		18					1
• Second foreign language - Spanish		18					1
• Training for Toeic		18					1
• Sport 3		19.5				2	0.15
• Project management		10.5				10.5	0.1
• Marketing and Business Intelligence	3	10.5				10.5	0.1
• Safety Health at Work		10.5				5	0.1
• Business Simulation 1				24		2	0.2
TOTAL	3	124	2	24	0	30	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	127	234	70	44	0	145	30
Face-to-face sum	475						

Semester 8 - unit *GPB 4*

Separation processes

ECTS : 8

Manager : *MARCHAL Luc*

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Distillation	8	10	16			24	2
• Membrane and Granular Separation	8	9.5	8			8	2
• Potable Water Treatment & Design	8	9.5	8			24	2
TOTAL	24	29	32	0	0	56	

Biological Reaction Engineering

ECTS : 8

Manager : *COGNE Guillaume*

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Kinetics in bioprocesses	12	13	12	12		20	3.5
• Bioreactors Engineering	12	13	12	12		20	3.5
TOTAL	24	26	24	24	0	40	

Tools for Engineers

ECTS : 7

Manager : *PRUVOST Jeremy*

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Numerical analysis	10	2	16			15	2
• Design of Experiments	6	5	4			5	1
• Bibliography Project	5		3	50		50	5
TOTAL	21	7	23	50	0	70	

Humanités 4

ECTS : 7

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Culture and public speaking		18					1
• Continuous Assessment(bis)							1
• French as a Foreign Language for engineering students		18					1
• Second foreign language - Spanish		18					1
• Training for Toeic		18					1
• Communicating on the workplace / Intercultural communication	3	10.5				5	0.15
• Quality approach and problem solving		10.5				10.5	0.1
• Sport 4		19.5				2	0.15
• Opening courses 2	10.5					10.5	0.1
• Professional Project 2 : professional project presentation				13.5		2.5	0.15
TOTAL	13.5	112.5	0	13.5	0	30.5	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	82.5	174.5	79	87.5	0	196.5	30
Face-to-face sum	423.5						

Semester 9 - unit *Bio-Industries PRO*

Microalgae biomass production

ECTS : 4

Manager : PRUVOST Jeremy

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Photobioreactor	24	3	10			10	4
TOTAL	24	3	10	0	0	10	

Eco-conception and bioconversions

ECTS : 5

Manager : GONCALVES Olivier

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Life cycle analysis	6					2	0.5
• Industrial Biotechnology	16	8				10	1.5
• Energy Management Processes	8.5	3				2	0.75
• Food industry	9.5	3.5				8	0.75
• Waste treatment/Water treatment	6	6				4	0.5
TOTAL	46	20.5	0	0	0	26	

Metabolic engineering

ECTS : 5

Manager : COGNE Guillaume

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Introduction	4						0
• Qualitative physiology	14	9				10	1.5
• Quantitative physiology	15	10				10	2.5
TOTAL	33	19	0	0	0	20	

Process control and command

ECTS : 5

Manager : TITICA Mariana

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Process control and command	29		21			20	3
• Project				9			1
TOTAL	29	0	21	9	0	20	

Humanités 5 PRO

ECTS : 4

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Work analysis		12				4	0.35
• Managing people		10.5				10.5	0.3
• Negotiation		10.5				10.5	0.3
• Sociology of innovation	4.5					4.5	0.5
• Training for TOEIC - s9							1
TOTAL	4.5	33	0	0	0	29.5	

Engineering project PRO

ECTS : 7

Manager : MARCHAL Luc

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• 4A internship report							2
• Engineering project PRO				80		70	5
TOTAL	0	0	0	80	0	70	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	136.5	75.5	31	89	0	175.5	30
Face-to-face sum	332						

Semester 9 - unit *Bio-industries 5*

Microalgae biomass production

ECTS : 4

Manager : PRUVOST Jeremy

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Photobioreactor	24	3	10			10	4
TOTAL	24	3	10	0	0	10	

Eco-conception and bioconversions

ECTS : 5

Manager : GONCALVES Olivier

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Life cycle analysis	6					2	0.5
• Industrial Biotechnology	16	8				10	1.5
• Energy Management Processes	8.5	3				2	0.75
• Food industry	9.5	3.5				8	0.75
• Waste treatment/Water treatment	6	6				4	0.5
TOTAL	46	20.5	0	0	0	26	

Metabolic engineering

ECTS : 5

Manager : COGNE Guillaume

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Introduction	4						0
• Qualitative physiology	14	9				10	1.5
• Quantitative physiology	15	10				10	2.5
TOTAL	33	19	0	0	0	20	

Process control and command

ECTS : 5

Manager : TITICA Mariana

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Process control and command	29		21			20	3
• Project				9			1
TOTAL	29	0	21	9	0	20	

Engineer's project

ECTS : 5

Manager : MARCHAL Luc

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Engineering project				130		70	5
• 4A internship report							2
TOTAL	0	0	0	130	0	70	

Humanités 5

ECTS : 6

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Work analysis		12				4	1
• Managing people		10.5				10.5	1
• Negotiation		10.5				10.5	1
• Professional project 3 : skills passport				12		3	1
• Business Simulation 2	20.5					10	1
• Sociology of innovation	4.5					4.5	1
• Training for TOEIC - s9							1
TOTAL	25	33	0	12	0	42.5	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	157	75.5	31	151	0	188.5	30
Face-to-face sum	414.5						

Semester 9 - unit *Industrie et eco-technologies PRO*

Process control and command

ECTS : 5

Manager : TITICA Mariana

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Process control and command	29		21			20	3
• Project				9			1
TOTAL	29	0	21	9	0	20	

Eco-conception and advanced reactors

ECTS : 5

Manager : GONCALVES Olivier

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Life cycle analysis	6					2	0.5
• Energy Management Processes	8.5	3				2	0.75
• Heterogeneous reactors	15	5		4		9	1.25
• Waste treatment/Water treatment	6	6				4	0.5
TOTAL	35.5	14	0	4	0	17	

Process modeling

ECTS : 5

Manager : SI-AHMED El-Khider

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Thermodynamic model	6	6	8			5	1.5
• Continuous and transient process simulation	16	6	12			15	2.5
TOTAL	22	12	20	0	0	20	

Humanités 5 PRO

ECTS : 4

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Work analysis		12				4	0.35
• Managing people		10.5				10.5	0.3
• Negotiation		10.5				10.5	0.3
• Sociology of innovation	4.5					4.5	0.5
• Training for TOEIC - s9							1
TOTAL	4.5	33	0	0	0	29.5	

Computational fluid dynamics

ECTS : 4

Manager : PRUVOST Jeremy

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Computational fluid dynamics	18	22		16		30	5
TOTAL	18	22	0	16	0	30	

Engineering project PRO

ECTS : 7

Manager : MARCHAL Luc

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• 4A internship report							2
• Engineering project PRO				80		70	5
TOTAL	0	0	0	80	0	70	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	109	81	41	109	0	186.5	30
Face-to-face sum	340						

Semester 9 - unit *Industries chimiques et éco-technologies 5*

Process control and command

ECTS : 5

Manager : TITICA Mariana

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Process control and command	29		21			20	3
• Project				9			1
TOTAL	29	0	21	9	0	20	

Engineer's project

ECTS : 5

Manager : MARCHAL Luc

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Engineering project				130		70	5
• 4A internship report							2
TOTAL	0	0	0	130	0	70	

Eco-conception and advanced reactors

ECTS : 5

Manager : GONCALVES Olivier

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Life cycle analysis	6					2	0.5
• Energy Management Processes	8.5	3				2	0.75
• Heterogeneous reactors	15	5		4		9	1.25
• Waste treatment/Water treatment	6	6				4	0.5
TOTAL	35.5	14	0	4	0	17	

Process modeling

ECTS : 5

Manager : SI-AHMED El-Khider

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Thermodynamic model	6	6	8			5	1.5
• Continuous and transient process simulation	16	6	12			15	2.5
TOTAL	22	12	20	0	0	20	

Computational fluid dynamics

ECTS : 4

Manager : PRUVOST Jeremy

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Computational fluid dynamics	18	22		16		30	5
TOTAL	18	22	0	16	0	30	

Humanités 5

ECTS : 6

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Work analysis		12				4	1
• Managing people		10.5				10.5	1
• Negotiation		10.5				10.5	1
• Professional project 3 : skills passport				12		3	1
• Business Simulation 2	20.5					10	1
• Sociology of innovation	4.5					4.5	1
• Training for TOEIC - s9							1
TOTAL	25	33	0	12	0	42.5	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	129.5	81	41	171	0	199.5	30
Face-to-face sum	422.5						

Semester 10 - unit *GPB 5*

Stage Ingénieur

ECTS : 30

Course	Lect	Tut	PW	Proj	WP	Asst	<i>Coef</i>
• Final project							<i>30</i>
TOTAL	0	0	0	0	0	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	0	0	0	0	0	0	30
Face-to-face sum							

Semester 10 - unit *GPB5 PRO*

Feedback seminar

ECTS : 2

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Experience feedback	24						2
TOTAL	24	0	0	0	0	0	

Final project PRO

ECTS : 28

Course	Lect	Tut	PW	Proj	WP	Asst	Coef
• Final project PRO							28
TOTAL	0	0	0	0	0	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	24	0	0	0	0	0	30
Face-to-face sum	24						

Part II

Sheets of courses

4A internship report

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *Rapport*

Manager : Guillaume COGNE

Absorption

Hours

Lect	Tut	PW	Proj	WP	Asst
12	8				8

Evaluation

One evaluation : *Examen*

Manager : Walid BLEL

Applied mathematics

Hours

Lect	Tut	PW	Proj	WP	Asst
12.5		20			20

Evaluation

2 evaluations :

- *Contrôle continu 1*
- *Contrôle continu 2*

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François LIRET, Maths en pratique à l'usage des étudiants, cours et exercices , Dunod, 2006.

Learning outcomes

Learning outcomes	N	A	M	E	O
• Maîtrise des notions mathématiques utiles en Génie des procédés	.	.	✓	.	.
• Avoir la capacité d'interpréter et d'analyser les informations données et de les traduire en problèmes mathématiques, de vérifier les résultats	✓

Manager : Annaig COTONNEC

Bibliography Project

Hours

Lect	Tut	PW	Proj	WP	Asst
5		3	50		50

Evaluation

One evaluation : *Rapport biblio*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Intégration des contraintes et des connaissances pour élaborer une solution technique	.	✓	.	.	.
• Rédaction de livrables, synthèse de résultats et argumentation de la solution choisie	.	.	✓	.	.
• Elaboration d'une démarche expérimentale de validation des choix	.	✓	.	.	.

Manager : Jeremy PRUVOST

Biological engineering

Hours

Lect	Tut	PW	Proj	WP	Asst
27		20			8

Evaluation

2 evaluations :

- *Examen*
- *TP*

Bibliography

Enfors, S.O. & Häggström, L. 2000. Bioprocess Technology. Fundamentals and Applications. Stockholm, Sweden. For the simulation practicals: Computer programme: Fermentation. A Practical approach series. PSI Computer programme, Boza Automatisering BV, Nuenen, NL

Atkinson B and F Mavituna, 1991 Biochemical Engineering & Biotechnology Handbook, Macmillan Publishers, 2nd edition.

Learning outcomes

Learning outcomes	N	A	M	E	O
• Connaître les principes et les pratiques en génie biochimique et génie microbiologique	·	·	✓	·	·
• Connaître les différentes cinétiques de production de biomasse et métabolites, de consommation de substrats, les réactions de maintenance et mort cellulaire pour quantifier et modéliser des cinétiques de croissance cellulaire ou des cinétiques enzymatiques	✓	·	·	·	·
• Maîtrise de la méthodologie d'analyse stœchiométrique des réactions biologiques en bioréacteurs	·	✓	·	·	·

Manager : Dominique GRIZEAU

Biology basics

Hours

Lect	Tut	PW	Proj	WP	Asst
19.5		20			8

Evaluation

2 evaluations :

- *Examen*
- *TP*

Bibliography

M. Larpent-Gourgaud, J.J. Sanglier: Biotechnologie - Principes et méthodes, 1992, Doin Editeurs.

J. Brock, M.T. Madigan, J.M. Martinko and J. Parker: Biology of micro-organisms, 9th edition, 2000.

A.L. Lehninger, D.L. Nelson, M.M. Cox: Principes de Biochimie, 1993, Flammarion.

J. Darnell, H. Lodish, D. Baltimore, De Boeck-Westmael: Biologie moléculaire de la cellule, 1993, 2e éd.

Learning outcomes

Learning outcomes	N	A	M	E	O
• Expérience du travail en (micro)-biologie intégrant les bonnes pratiques de laboratoire (BPL)	·	✓	·	·	·
• Connaissance générale des approches méthodologiques appliquée à la biologie	✓	·	·	·	·
• Maîtrise des techniques d'isolement et caractérisation de micro-organismes d'intérêt industriel	·	·	✓	·	·

Manager : Dominique GRIZEAU

Bioreactors Engineering

Hours

Lect	Tut	PW	Proj	WP	Asst
12	13	12	12		20

Evaluation

2 evaluations :

- *CC*
- *TP/Projet*

Manager : Guillaume COGNE

Business Simulation 1

Hours

Lect	Tut	PW	Proj	WP	Asst
			24		2

Evaluation

One evaluation : *Contrôle continu*

Goals

Put into practice teachings " HES " in a global approach of the company by integrating its various economic, commercial, financial, human dimensions.

Understand the link between these dimensions.

Understand the enterprise by using a concrete case.

Prerequisites

accounting and economics

Manager : Chrystèle GONCALVES

Business Simulation 2

Hours

Lect	Tut	PW	Proj	WP	Asst
20.5					10

Evaluation

One evaluation : *Contrôle continu*

Outline

Management of a virtual company in competitive environment. Taking of decisions, from the production organisation until the marketing.

Realization of specific works at the same time as the decisions of management :

- Strategic presentation of the company
- Dashboards
- Negotiation...

Goals

Synthesize and put into practice teachings " HES " in a global approach of the company in international environment by integrating its various economic, commercial, financial, human and societal dimensions, into a perspective of sustainable development. Use on a concrete case tools and methods such as project management, dashboards, negotiation ...

Bibliography

Celles des cours précédents.

Prerequisites

All the courses HES of 3rd and 4th year, in particular the simulation of the business management of 4th year.

Manager : Jacques MOREAU

Communicating on the workplace / Intercultural communication

Hours

Lect	Tut	PW	Proj	WP	Asst
3	10.5				5

Evaluation

One evaluation : *Contrôle continu*

Outline

The sessions will alternate lectures, practical exercises, simulations, collective debriefing.

10,5 hours in groups will be dedicated to Communication at work, and 2,5 hours of lecture to Intercultural communication.

Goals

To discover the various facets of business communication.

To learn how to observe interpersonal or group communication situations, to analyse them and to adjust one's communication style.

To be able to express oneself in public.

To present the challenges and the major principles of the intercultural communication.

Bibliography

La communication en entreprise, J-P. Lehnisch, PUF, coll. Que sais-je ?, 2011

Comment leur dire? La process communication, G. Collignon, Inter-Editions, 2010

Prerequisites

Minimal knowledge on companies.

Learning outcomes

Learning outcomes	N	A	M	E	O
• To be able to distinguish the different forms of communication in business	✓
• To be able to observe and analyze a communication situation	.	✓	.	.	.
• To be able to understand the effect of one's communication style and to adjust it	.	✓	.	.	.
• To be able to express oneself in public	.	✓	.	.	.
• To understand the stakes connected to the intercultural communication	✓
• To know the main theories, the models and the tools of analysis of the interculturalism	✓
• To be able to distinguish the different forms of communication in business	✓
• To be able to observe and analyze a communication situation	.	✓	.	.	.
• To be able to understand the effect of one's communication style and to adjust it	.	✓	.	.	.
• To be able to express oneself in public	.	✓	.	.	.
• To understand the stakes connected to the intercultural communication	✓
• To know the main theories, the models and the tools of analysis of the interculturalism	✓
• To be able to distinguish the different forms of communication in business	✓
• To be able to observe and analyze a communication situation	.	✓	.	.	.
• To be able to understand the effect of one's communication style and to adjust it	.	✓	.	.	.
• To be able to express oneself in public	.	✓	.	.	.
• To understand the stakes connected to the intercultural communication	✓
• To know the main theories, the models and the tools of analysis of the interculturalism	✓
• To be able to distinguish the different forms of communication in business	✓
• To be able to observe and analyze a communication situation	.	✓	.	.	.
• To be able to understand the effect of one's communication style and to adjust it	.	✓	.	.	.
• To be able to express oneself in public	.	✓	.	.	.
• To understand the stakes connected to the intercultural communication	✓
• To know the main theories, the models and the tools of analysis of the interculturalism	✓
• To be able to distinguish the different forms of communication in business	✓
• To be able to observe and analyze a communication situation	.	✓	.	.	.
• To be able to understand the effect of one's communication style and to adjust it	.	✓	.	.	.
• To be able to express oneself in public	.	✓	.	.	.
• To understand the stakes connected to the intercultural communication	✓
• To know the main theories, the models and the tools of analysis of the interculturalism	✓
• To be able to distinguish the different forms of communication in business	✓
• To be able to observe and analyze a communication situation	.	✓	.	.	.
• To be able to understand the effect of one's communication style and to adjust it	.	✓	.	.	.
• To be able to express oneself in public	.	✓	.	.	.
• To understand the stakes connected to the intercultural communication	✓
• To know the main theories, the models and the tools of analysis of the interculturalism	✓
• To be able to distinguish the different forms of communication in business	✓

Manager : Anouk GREVIN

Computational fluid dynamics

Hours

Lect	Tut	PW	Proj	WP	Asst
18	22		16		30

Evaluation

3 evaluations :

- *CC*
- *Rapport projet CFD*
- *Soutenance CFD*

Manager : Jeremy PRUVOST

Continuous Assessment (bis)

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *CC*

Continuous Assessment(bis)

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *CC*

Continuous and transient process simulation

Hours

Lect	Tut	PW	Proj	WP	Asst
16	6	12			15

Evaluation

One evaluation : *Examen écrit*

Manager : El-Khider SI-AHMED

Creativity

Hours

Lect	Tut	PW	Proj	WP	Asst
	7.5				7.5

Evaluation

One evaluation : *Eval projet créatif*

Outline

Definition of the creative Projects. Creativity methods.

Goals

Global definition "Creativity". Acquire knowledges : The different creative methods (tools) ; Create a project (non-existent product) (team)

Bibliography

Créativité et Innovation Tayeb Louafa et Francis-Luc Perret (éditions presse polytechniques et universitaires romandes).

La boîte à outils de la Créativité de François Desbois, Arnaud Groff et Emmanuel Chenevriér. Editions Dunod.

Prerequisites

None

Manager : Marc BIDAN

Culture and public speaking

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

2 evaluations :

- *Contrôle continu TD*
- *DS*

Design of Experiments

Hours

Lect	Tut	PW	Proj	WP	Asst
6	5	4			5

Evaluation

One evaluation : *CC*

Manager : Abdellah ARHALIASS

Discovery of firms, professions and entrepreneurship

Hours

Lect	Tut	PW	Proj	WP	Asst
2	10.5				10.5

Evaluation

One evaluation : *Contrôle continu+SO*

Outline

Format: 7 sessions of TD 1:30

1 / Presentation of the device and constitution of working groups (binomial / trinomial) - Target and get an interview with a more than 5 year -experienced professional,

2 / Develop interview guides

3 / Monitoring of research and decision-appointment of each binomial or trinomial

4 / Preparation refunds after interviews and visits

5 and 6 / Refunds oral of each binomial / trinomial : analysis and input from interviews

7 / Feedback with the presence of one (or more) professional(s) interviewed(s) within the device.

Note : Each interview produce a summary provided to the Alumni Association and / or partnership relations of the school.

Goals

Discover the business and engineering fields through interview(s) of professionals and visit(s) of company(ies) in order to clarify the career aspirations of students.

Manager : Maud BEAUTRAIS SATTLER

Distillation

Hours

Lect	Tut	PW	Proj	WP	Asst
8	10	16			24

Evaluation

2 evaluations :

- *CC*
- *TP*

Manager : Luc MARCHAL

Economy

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				10.5

Evaluation

One evaluation : *Contrôle continu*

Outline

CHAPTER 1 : THE ECONOMIC FUNDAMENTALS
CHAPTER 2 : PRODUCTION, DISTRIBUTION, EXPENSES
CHAPTER 3 : INTERNATIONAL ECONOMICS
CHAPTER 4 : FINANCIAL CRISIS

Goals

Understand the current economic problems to lie as a citizen and as a future engineer
Understand the issues businesses in the current economic environment.

Bibliography

"Principe d'économie moderne", Joseph Stiglitz, Carl E. Walsh, Jean-Dominique Lafay, de Boeck, 3ème édition
"L'introduction à l'économie" Jacques Généreux
"Une brève histoire des crises financières" Jacques Généreux, Ed La découverte.

Prerequisites

No

Learning outcomes

Learning outcomes	N	A	M	E	O
• knowing the basis of economics (supply, demand, prices, markets, crisis, exchange rate, speculation?)	✓
• knowing how to calculate growth rates, elasticities, indices, exchange rates?	.	✓	.	.	.
• being able to explain links between cause and effects economic	✓
• knowing the basis of economics (supply, demand, prices, markets, crisis, exchange rate, speculation?)	✓
• knowing how to calculate growth rates, elasticities, indices, exchange rates?	.	✓	.	.	.
• being able to explain links between cause and effects economic	✓
• knowing the basis of economics (supply, demand, prices, markets, crisis, exchange rate, speculation?)	✓
• knowing how to calculate growth rates, elasticities, indices, exchange rates?	.	✓	.	.	.
• being able to explain links between cause and effects economic	✓
• knowing the basis of economics (supply, demand, prices, markets, crisis, exchange rate, speculation?)	✓
• knowing how to calculate growth rates, elasticities, indices, exchange rates?	.	✓	.	.	.
• being able to explain links between cause and effects economic	✓
• knowing the basis of economics (supply, demand, prices, markets, crisis, exchange rate, speculation?)	✓
• knowing how to calculate growth rates, elasticities, indices, exchange rates?	.	✓	.	.	.
• being able to explain links between cause and effects economic	✓
• knowing the basis of economics (supply, demand, prices, markets, crisis, exchange rate, speculation?)	✓
• knowing how to calculate growth rates, elasticities, indices, exchange rates?	.	✓	.	.	.
• being able to explain links between cause and effects economic	✓
• knowing the basis of economics (supply, demand, prices, markets, crisis, exchange rate, speculation?)	✓
• knowing how to calculate growth rates, elasticities, indices, exchange rates?	.	✓	.	.	.
• being able to explain links between cause and effects economic	✓
• knowing the basis of economics (supply, demand, prices, markets, crisis, exchange rate, speculation?)	✓
• knowing how to calculate growth rates, elasticities, indices, exchange rates?	.	✓	.	.	.
• being able to explain links between cause and effects economic	✓
• knowing the basis of economics (supply, demand, prices, markets, crisis, exchange rate, speculation?)	✓
• knowing how to calculate growth rates, elasticities, indices, exchange rates?	.	✓	.	.	.
• being able to explain links between cause and effects economic	✓
• knowing the basis of economics (supply, demand, prices, markets, crisis, exchange rate, speculation?)	✓
• knowing how to calculate growth rates, elasticities, indices, exchange rates?	.	✓	.	.	.
• being able to explain links between cause and effects economic	✓
• knowing the basis of economics (supply, demand, prices, markets, crisis, exchange rate, speculation?)	✓

Manager : Chrystèle GONCALVES

Energetics

Hours

Lect	Tut	PW	Proj	WP	Asst
14	15				15

Evaluation

One evaluation : *Examen*

Manager : Annaig COTONNEC

Energy Management Processes

Hours

Lect	Tut	PW	Proj	WP	Asst
8.5	3				2

Evaluation

One evaluation : *Examen écrit*

Engineering project

Hours

Lect	Tut	PW	Proj	WP	Asst
			130		70

Evaluation

3 evaluations :

- *Autoevaluation*
- *Rapport*
- *Soutenance*

Manager : Luc MARCHAL

Engineering project PRO

Hours

Lect	Tut	PW	Proj	WP	Asst
			80		70

Evaluation

3 evaluations :

- *Autoeval*
- *Rapport*
- *Soutenance*

Epistemology and methods of technical culture

Hours

Lect	Tut	PW	Proj	WP	Asst
	15				15

Evaluation

One evaluation : *Rapport+Sout+CC*

Bibliography

Simondon G, Du monde d'existence des objets techniques, Paris, Aubier, 1989

Mauss M. « Les techniques du corps », extrait du *Journal de Psychologie*, XXXII, n 3-4, 15 mars-15 avril 1936, Communication présentée à la Société de Psychologie le 17 mai 1934, in : *Sociologie et anthropologie*, Paris, Presses universitaires de France, Paris, 1968, pour la présente édition, pp. 363-383

Mumford L, *Technique et civilisation*, Paris, Le Seuil, 1950, pour la traduction française

Sennett R., *Ce que sait la main*, Paris, Paris, Albin Michel, 2010, pour la traduction française

Giedon, S., *La mécanisation au pouvoir*, tomes 1, 2, 3, Paris, Médiations, 1980, pour la traduction française

Le reste de la bibliographie est à constituer par chaque binôme en fonction du thème annuel et des sujets choisis par les étudiants

Learning outcomes

Manager : Dominique PECAUD

Experience feedback

Hours

Lect	Tut	PW	Proj	WP	Asst
24					

Evaluation

One evaluation : *Controle Continue*

Manager : Maud BEAUTRAIS SATTLER

Extraction and purification

Hours

Lect	Tut	PW	Proj	WP	Asst
12	8				8

Evaluation

2 evaluations :

- *Examen*
- *Dossier*

Manager : Luc MARCHAL

Final project

Hours

Lect Tut PW Proj WP Asst

Evaluation

2 evaluations :

- *Manuscrit*
- *Soutenance*

Manager : Luc MARCHAL

Final project PRO

Hours

Lect Tut PW Proj WP Asst

Evaluation

2 evaluations :

- *Manuscrit*
- *Soutenance*

Flow in Porous Media

Hours

Lect	Tut	PW	Proj	WP	Asst
11	14	8			18

Evaluation

2 evaluations :

- *CC*
- *TP/projet*

Manager : Nour-Eddine SABIRI

Fluid mechanics

Hours

Lect	Tut	PW	Proj	WP	Asst
28	24	8			24

Evaluation

3 evaluations :

- *Contrôle continu*
- *Examen*
- *TP*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Connaissance des approches avancées de type analyse locale (restreinte ici aux écoulements laminaires)	·	✓	·	·	·
• Application de bilans (masse, énergie, quantité de mouvement) aux échelles macroscopiques (obtention de théorèmes intégraux)	·	·	✓	·	·
• Application de bilans (masse, énergie, quantité de mouvement) aux échelles microscopiques (obtention d'équations locales de conservation)	·	·	✓	·	·

Manager : El-Khider SI-AHMED

Food industry

Hours

Lect	Tut	PW	Proj	WP	Asst
9.5	3.5				8

Evaluation

One evaluation : *Examen écrit*

French as a Foreign Language for engineering students

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

French as a Foreign Language for engineering students

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Grammar and professional English 1

Hours

Lect	Tut	PW	Proj	WP	Asst
	40				

Evaluation

2 evaluations :

- *CC*
- *DS*

Grammar, Toeic and professional English 2

Hours

Lect	Tut	PW	Proj	WP	Asst
	39	2			

Evaluation

3 evaluations :

- *CC*
- *Tutorat*
- *Toeic*

Heat Exchangers

Hours

Lect	Tut	PW	Proj	WP	Asst
3	1	4			

Evaluation

One evaluation : *CC*

Manager : El-Khider SI-AHMED

Heat transfert

Hours

Lect	Tut	PW	Proj	WP	Asst
19	13.5				13.5

Evaluation

2 evaluations :

- *Contrôle continu*
- *Examen*

Manager : El-Khider SI-AHMED

Heterogeneous reactors

Hours

Lect	Tut	PW	Proj	WP	Asst
15	5		4		9

Evaluation

One evaluation : *Examen*

Manager : Luc MARCHAL

Homogeneous reactors - Part I

Hours

Lect	Tut	PW	Proj	WP	Asst
12	14.5	8	4		9

Evaluation

2 evaluations :

- *CC*
- *TP/Projet*

Manager : Caroline GENTRIC

Homogeneous reactors - Part II

Hours

Lect	Tut	PW	Proj	WP	Asst
12	14.5	8	4		9

Evaluation

3 evaluations :

- *CC*
- *TP/Projet*
- *Examen écrit*

Manager : Caroline GENTRIC

Industrial Biotechnology

Hours

Lect	Tut	PW	Proj	WP	Asst
16	8				10

Evaluation

One evaluation : *Examen écrit*

Industrial chemistry

Hours

Lect	Tut	PW	Proj	WP	Asst
12	12				6

Evaluation

One evaluation : *Examen*

Manager : Guillaume COGNE

Introduction to chromatography

Hours

Lect	Tut	PW	Proj	WP	Asst
8	8	16			5

Evaluation

2 evaluations :

- *Examen*
- *TP*

Manager : Dominique GRIZEAU

Kinetics and thermochemistry

Hours

Lect	Tut	PW	Proj	WP	Asst
16	16	16			16

Evaluation

3 evaluations :

- *Contrôle continu 1*
- *Contrôle continu 2*
- *TP*

Bibliography

Bibliographie de la partie Thermodynamique chimique :

- Thermodynamique chimique, H Prépa, A Durupthy et al., Hachette
- Chimie 1 et 2, H Prépa, A Durupthy et al., Hachette
- Physique ,1 Bio-Véto, P Grécias, JP Migeon, Tec et Doc
- Chimie 1 et 2, Bio-Véto, P Grécias, JP Migeon, Tec et Doc
- Chimie générale, P Atkins, Intereditions
- Chimie générale, Mc Quarrie/ Rock, De Boeck
- Thermodynamique et équilibres chimiques, Deug Sciences, A Gruyer, Dunod

Bibliographie de la partie cinétique chimique :

- Problèmes de cinétique chimique avec solutions détaillées et rappels de cours. J-C Dechaux et collègues. Editions Masson.1980.
- Eléments de cinétique et de catalyse. B. Frémaux. Lavoisier Tech et Doc. 1989.
- L'essentiel de la cinétique et de la thermodynamique chimique à travers les problèmes de concours. Danielle Guignard. Editions Ellipses. 1992.
- Cinétique chimique thermodynamiques. Exercices et problèmes corrigés. Hachette supérieur. 1997.
- Cinétique et catalyse. G. Scacchi et collègues. Editions Lavoisier Tech et Doc. 2011.
- CAPES externe 2000-2005 Agrégation de physique 2000-2005 - Problèmes de chimie avec solutions et annexes. J. Mesplède. Editions Bréal.

Learning outcomes

Learning outcomes	N	A	M	E	O
• Appréhender la notion de vitesse de réaction chimique	✓
• Comprendre l'intérêt de la connaissance du mécanisme réactionnel pour expliquer l'ordre d'une réaction	✓
• Comprendre la notion d'équilibre chimique	✓
• Maîtrise des notions liées aux variables d'état thermodynamiques	.	.	✓	.	.
• Applicatif aux réactions chimiques des procédés et bioprocédés	.	✓	.	.	.
• Maîtrise des aspects énergétiques/thermodynamiques liés aux processus réactionnels	.	.	✓	.	.

Manager : Agnès MONTILLET

Kinetics in bioprocesses

Hours

Lect	Tut	PW	Proj	WP	Asst
12	13	12	12		20

Evaluation

2 evaluations :

- *CC*
- *TP/Projet*

Manager : Agnès MONTILLET

Life cycle analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
6					2

Evaluation

One evaluation : *Examen écrit*

Management tools

Hours

Lect	Tut	PW	Proj	WP	Asst
	10.5				5

Evaluation

One evaluation : *Contrôle continu*

Outline

INTRODUCTION

CHAPTER 1 : BASIS OF ACCOUNTING DOCUMENTS

CHAPTER 2 : SOME CURRENT OPERATIONS OF ACCOUNTING

Goals

knowing the basics of management and basic accounting documents of the company

Bibliography

"Les outils fondamentaux de la gestion" Hélène Charrier, Sarah De Gryse, Gualino éditeur.

Prerequisites

No

Manager : Chrystèle GONCALVES

Managing people

Hours

Lect	Tut	PW	Proj	WP	Asst
	10.5				10.5

Evaluation

One evaluation : *Contrôle continu*

Outline

The sessions will alternate lectures, practical exercises, simulations, collective debriefing.

Goals

To understand the role of a manager and the paradoxes of management, main management issues, individual and organisational behavior.

To prepare oneself to leadership positions.

Bibliography

Management, l'essentiel des concepts et des pratiques, S. Robbins, D. DeCenzo, M. Coulter, Ed. Pearson.

Manager, les meilleures pratiques du management, M. Barabel, O. Meier, Dunod.

Management et leadership, C. Dejoux, Dunod, coll. Les topos.

Prerequisites

Minimal knowledge on companies.

Team working experience in a professional context.

Learning outcomes

Learning outcomes	N	A	M	E	O
• To be able to analyze human or managerial issues and to draw conclusions for action	.	✓	.	.	.
• To be able to identify the management style adapted to a situation	✓
• To know the main theoretical currents in organization theory	✓
• To be able to analyze human or managerial issues and to draw conclusions for action	.	✓	.	.	.
• To be able to identify the management style adapted to a situation	✓
• To know the main theoretical currents in organization theory	✓
• To be able to analyze human or managerial issues and to draw conclusions for action	.	✓	.	.	.
• To be able to identify the management style adapted to a situation	✓
• To know the main theoretical currents in organization theory	✓
• To be able to analyze human or managerial issues and to draw conclusions for action	.	✓	.	.	.
• To be able to identify the management style adapted to a situation	✓
• To know the main theoretical currents in organization theory	✓
• To be able to analyze human or managerial issues and to draw conclusions for action	.	✓	.	.	.
• To be able to identify the management style adapted to a situation	✓
• To know the main theoretical currents in organization theory	✓
• To be able to analyze human or managerial issues and to draw conclusions for action	.	✓	.	.	.
• To be able to identify the management style adapted to a situation	✓
• To know the main theoretical currents in organization theory	✓
• To be able to analyze human or managerial issues and to draw conclusions for action	.	✓	.	.	.
• To be able to identify the management style adapted to a situation	✓
• To know the main theoretical currents in organization theory	✓
• To be able to analyze human or managerial issues and to draw conclusions for action	.	✓	.	.	.
• To be able to identify the management style adapted to a situation	✓
• To know the main theoretical currents in organization theory	✓
• To be able to analyze human or managerial issues and to draw conclusions for action	.	✓	.	.	.
• To be able to identify the management style adapted to a situation	✓
• To know the main theoretical currents in organization theory	✓
• To be able to analyze human or managerial issues and to draw conclusions for action	.	✓	.	.	.
• To be able to identify the management style adapted to a situation	✓
• To know the main theoretical currents in organization theory	✓
• To be able to analyze human or managerial issues and to draw conclusions for action	.	✓	.	.	.

Manager : Anouk GREVIN

Marketing and Business Intelligence

Hours

Lect	Tut	PW	Proj	WP	Asst
3	10.5				10.5

Evaluation

One evaluation : *Contrôle continu*

Outline

1 - The Marketing approach

From needs to proposals

Place of the Marketing in a company

Evolutions of the Marketing, value creation, ICTS, CRM, one to one ?

2 - The Strategic Marketing

Corporate strategies, strategic diagnostics (swot, Porter, life cycle, BCG ?)

Marketing strategies, segmentation, targeting, positioning, innovation?

MIS, techniques of studies, market study: demand, offers, environment

3. The operational marketing

Marketing Mix, Product, Place, Promotion, Price

4. Conference Economic Intelligence : stakes and main functions of the economic intelligence and methodology of the watch

Goals

Present the approach marketing, heart of the activity of the company, which concerns all the functions of the company, in term of value creation and satisfaction of the needs for the customer. Present the stakes, the strategic aspects and the main operational levers.

Introduction to business intelligence.

Bibliography

G. Armstrong, P Kotler ; « Principes de Marketing » ; Pearson Education - Mercator; "Mercator"; Dunod. Dernières éditions.

Audigier M., Coulon G., Rassat P. : « L'intelligence économique » - Economica

Prerequisites

General knowledge of the company and its functions. Introduction in the economy and the management.

Learning outcomes

Manager : Luc OILI

Mass transfer

Hours

Lect	Tut	PW	Proj	WP	Asst
9.5	9.5				9.5

Evaluation

2 evaluations :

- *Contrôle continu*
- *Examen*

Manager : El-Khider SI-AHMED

Membrane and Granular Separation

Hours

Lect	Tut	PW	Proj	WP	Asst
8	9.5	8			8

Evaluation

2 evaluations :

- *CC*
- *TP*

Manager : Anthony MASSE

Methods and concepts in (bio)process engineering

Hours

Lect	Tut	PW	Proj	WP	Asst
12	12				12

Evaluation

2 evaluations :

- *Contrôle continu*
- *Examen*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Maîtrise des connaissances générales nécessaires à la compréhension et à la mise en œuvre d'un procédé	.	.	✓	.	.
• Etre capable d'appliquer les lois de conservation de la matière à des opérations utiles en chimie et biochimie industrielles	.	✓	.	.	.

Manager : Guillaume COGNE

Microbiology and catalysis

Hours

Lect	Tut	PW	Proj	WP	Asst
12	12				6

Evaluation

One evaluation : *Examen*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Maîtrise des connaissances générales nécessaires à la compréhension et à la mise en œuvre d'un procédé	.	.	✓	.	.
• Capacité d'analyse critique et de proposition de projets biotechnologiques	.	✓	.	.	.

Manager : Guillaume COGNE

Negotiation

Hours

Lect	Tut	PW	Proj	WP	Asst
	10.5				10.5

Evaluation

One evaluation : *CC Ecrit et/ou Oral*

Outline

- 1 - Argumentation
- 2 - Negotiation and management of conflicts
 - 2.1 - Introduction to the system negotiation
 - 2.2 - Strategies of negotiation
 - 2.3 - Technical and tactical of negotiation
 - 2.4 - Main theoretical currents

Goals

Make sensitive the pupils in theories, techniques and stakes in the contemporary management in resituant in a historical perspective. Give them the theoretical and practical bases of the negotiation with various partners of the engineer to advance projects, take out of situations of blocking or manage conflicts.

Bibliography

Stimec A. ; « La négociation » ; Dunod
Fisher, Ury ; « Comment réussir une négociation » ; Seuil

Prerequisites

General knowledge of companies.
Interpersonal communication in companies

Manager : Jacques MOREAU

Non-Newtonian Fluids Flow

Hours

Lect	Tut	PW	Proj	WP	Asst
3	5				3

Evaluation

One evaluation : *CC*

Manager : El-Khider SI-AHMED

Numerical analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
10	2	16			15

Evaluation

2 evaluations :

- *CC*
- *TP*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Résolution des systèmes linéaires	.	.	✓	.	.
• Posséder les principaux algorithmes de résolution utilisés en Génie des Procédés	.	.	✓	.	.
• Résolution des équations aux dérivées partielles	.	.	✓	.	.

Manager : El-Khider SI-AHMED

Opening courses 1

Hours

Lect	Tut	PW	Proj	WP	Asst
10.5					10.5

Evaluation

One evaluation : *Contrôle continu*

Manager : Chrystèle GONCALVES

Opening courses 2

Hours

Lect	Tut	PW	Proj	WP	Asst
10.5					10.5

Evaluation

One evaluation : *Contrôle continu*

Manager : Chrystèle GONCALVES

Phenomena of distribution

Hours

Lect	Tut	PW	Proj	WP	Asst
7.5	7.5				5

Evaluation

One evaluation : *Examen*

Manager : El-Khider SI-AHMED

Photobioreactor

Hours

Lect	Tut	PW	Proj	WP	Asst
24	3	10			10

Evaluation

One evaluation : *Examen écrit*

Manager : Jeremy PRUVOST

Potable Water Treatment & Design

Hours

Lect	Tut	PW	Proj	WP	Asst
8	9.5	8			24

Evaluation

2 evaluations :

- *CC*
- *TP*

Manager : Matthieu FRAPPART

Practical teaching in unit operations

Hours

Lect	Tut	PW	Proj	WP	Asst
		24			5

Evaluation

One evaluation : *TP*

Manager : Luc MARCHAL

Process control and command

Hours

Lect	Tut	PW	Proj	WP	Asst
29		21			20

Evaluation

One evaluation : *Examen écrit*

Bibliography

Manuels utilisateur des logiciels Matlab-Simulink

Learning outcomes

Learning outcomes	N	A	M	E	O
• Connaître les différentes méthodes pour le contrôle, la simulation et la commande de procédés biologiques, physiques, ou chimiques	·	·	✓	·	·
• Formation aux outils et méthodes nécessaires à la conduite des procédés : acquisition, automatisme, observateurs, modélisation et optimisation par simulation	·	✓	·	·	·
• Etre capable de mettre en place une simulation de procédé à l'aide du logiciel Matlab®-Simulink®	·	✓	·	·	·

Manager : Mariana TITICA

Processes with Phase Change

Hours

Lect	Tut	PW	Proj	WP	Asst
4	9.5	8			4

Evaluation

2 evaluations :

- *Examen écrit*
- *TP/projet*

Manager : Alain Lebail

Professional English 3

Hours

Lect	Tut	PW	Proj	WP	Asst
	19	2			

Evaluation

2 evaluations :

- *CC*
- *Tutorat*

Professional Project 2 : professional project presentation

Hours

Lect	Tut	PW	Proj	WP	Asst
			13.5		2.5

Evaluation

One evaluation : *Note synthèse + oral*

Outline

Path : 4 sessions of 3h TD

1 / Portfolio "Exploration Project Professional" : my "professionnel journey" those last years - changes - choices - motivations...

2 / My professionnall project : what I intended, the way to go, anticipate steps (especially the choice of option at the end of the fourth year)

3 and 4 / I introduce myself, my skills, my project : simulations and role plays

Goals

Clarify the professional project and be able to present it orally in different circumstances (professional network meetings, hiring individual or collective interview , student lounge, video resume, ..)

Bibliography

"Le Carnet de Route universitaire et professionnel" - SUIO de l'Université de Nantes - 2008

Prerequisites

Professionnal project 1 (S5)

Discovery of firms and professions (S6)

Manager : Maud BEAUTRAIS SATTLER

Professional project 1 : Introduction

Hours

Lect	Tut	PW	Proj	WP	Asst
			7.5		1.5

Evaluation

One evaluation : $CV+CH+CC$

Outline

1 / Introduction: Presentation of the professional project modules throughout the 3 years of studies at Polytech 'Nantes.

2 / Mind mapping of the state of departure

3 / Production or updating of resum

4 / Mind mapping of student network and researches

Goals

Reflecting students on the prospect of a professional project by making an inventory of their resources.

Manager : Maud BEAUTRAIS SATTLER

Professional project 3 : skills passport

Hours

Lect	Tut	PW	Proj	WP	Asst
			12		3

Evaluation

One evaluation : *Examen*

Outline

1 / Day skills (7.5 h TD)

Course within six thematic workshops (12 to 15 students maximum) in connection with the assessment of skills and seeking their first job.

Production of a paper on key competencies.

2 / Job interview simulation platform (3h TD)

Job Interviews for the last training (speed dating) with business partners Polytech'Nantes

Goals

Achieve an end-of course student appraisal to help the student:

- To find an internship study linked with his professional project
- To stand in front of a future recruiter with realism about his skills.

Bibliography

"Le Carnet de Route universitaire et professionnel" - SUIO de l'Université de Nantes - 2008

Prerequisites

Professionnal Project 2 : Professional project presentation

Manager : Maud BEAUTRAIS SATTLER

Programming and algorithmics

Hours

Lect	Tut	PW	Proj	WP	Asst
20		20			17

Evaluation

3 evaluations :

- *Examen*
- *TP 1*
- *TP 2*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Etre capable d'écrire un algorithme simple (une boucle, structure de données type vecteur)	·	✓	·	·	·
• Etre capable d'écrire un programme en traduisant un algorithme utilisant une structure de donnée de type tableau	·	✓	·	·	·
• Etre capable de comprendre les interactions et le fonctionnement d'un ordinateur	·	✓	·	·	·

Manager : David DELFIEU

Project

Hours

Lect	Tut	PW	Proj	WP	Asst
			9		

Evaluation

One evaluation : *Projet*

Project management

Hours

Lect	Tut	PW	Proj	WP	Asst
	10.5				10.5

Evaluation

One evaluation : *Contrôle continu*

Outline

1 / Introduction:

Project Definition - Project Management - Specifications of a project - Project Types

2 / Stakeholders:

Instances of project, categories of actors, roles and borders - gouvernance project - the project leader missions

3 / The project life cycle

The phasing of the project and its steps (the emergence - set up - implementation - evaluation)

For each phase: objectives, operations, deliverables, tools

4 / Methods and tools of project management (with exercises)

Block diagram, work and responsibilities - Project Planning and Resource Management - Project Dashboard - Risk Management (FMEA)

5 / Communication and changes management (Basic)

Communication Plan - Impact analysis and changes management sheet

Goals

Provide basic knowledge of project management allowing students to understand the different types of projects, stakeholders and bodies, project methodology (phasing, decisions, methods and tools) in order to prepare them to take responsibility in a simple project or to contribute to the creation of a more complex project (internship and / or transversal project and / or student project)

Bibliography

Le dictionnaire de management de projet - AFITEP (5e édition), AFNOR ,Paris, impr 2010

La conduite de projet, Hugues Marchat, Editions d'Organisation, Paris, juillet 2008

Le Kit du Chef de projet, Hugues Marchat, Livres outils ? Editions d'organisation, Paris, 2010

Learning outcomes

Learning outcomes	N	A	M	E	O
• Know and apply the methods and tools of traditional project management, understand their context of use, their advantages and limitations	•	✓	•	•	•
• Plan a mission according to project method : distinguish purpose / objectives / means, plan action, anticipate major risks, evaluate the outputs.	•	✓	•	•	•
• Identify stakeholders in a project and understand their respective roles towards the project.	•	✓	•	•	•
• Pilot a project = know the responsibilities of a project leader	✓	•	•	•	•
• Know and apply the methods and tools of traditional project management, understand their context of use, their advantages and limitations	•	✓	•	•	•
• Plan a mission according to project method : distinguish purpose / objectives / means, plan action, anticipate major risks, evaluate the outputs.	•	✓	•	•	•
• Identify stakeholders in a project and understand their respective roles towards the project.	•	✓	•	•	•
• Pilot a project = know the responsibilities of a project leader	✓	•	•	•	•
• Know and apply the methods and tools of traditional project management, understand their context of use, their advantages and limitations	•	✓	•	•	•
• Plan a mission according to project method : distinguish purpose / objectives / means, plan action, anticipate major risks, evaluate the outputs.	•	✓	•	•	•
• Identify stakeholders in a project and understand their respective roles towards the project.	•	✓	•	•	•
• Pilot a project = know the responsibilities of a project leader	✓	•	•	•	•
• Know and apply the methods and tools of traditional project management, understand their context of use, their advantages and limitations	•	✓	•	•	•
• Plan a mission according to project method : distinguish purpose / objectives / means, plan action, anticipate major risks, evaluate the outputs.	•	✓	•	•	•
• Identify stakeholders in a project and understand their respective roles towards the project.	•	✓	•	•	•
• Pilot a project = know the responsibilities of a project leader	✓	•	•	•	•
• Know and apply the methods and tools of traditional project management, understand their context of use, their advantages and limitations	•	✓	•	•	•
• Plan a mission according to project method : distinguish purpose / objectives / means, plan action, anticipate major risks, evaluate the outputs.	•	✓	•	•	•
• Identify stakeholders in a project and understand their respective roles towards the project.	•	✓	•	•	•
• Pilot a project = know the responsibilities of a project leader	✓	•	•	•	•
• Know and apply the methods and tools of traditional project management, understand their context of use, their advantages and limitations	•	✓	•	•	•
• Plan a mission according to project method : distinguish purpose / objectives / means, plan action, anticipate major risks, evaluate the outputs.	•	✓	•	•	•
• Identify stakeholders in a project and understand their respective roles towards the project.	•	✓	•	•	•

Qualitative physiology

Hours

Lect	Tut	PW	Proj	WP	Asst
14	9				10

Evaluation

One evaluation : *Examen écrit*

Manager : Olivier GONCALVES

Quality approach and problem solving

Hours

Lect	Tut	PW	Proj	WP	Asst
	10.5				10.5

Evaluation

One evaluation : *Contrôle continu*

Outline

1 / Origins and forms of quality management:

Product quality - Quality system - quality project - management systems - ISO 9001 - process approach - opening trades on standards

2 / Principles of organization based on the process approach:

Typology of processes - Mapping - Organizational Interfaces

3 / approach and tools useful to the engineer:

QQOQCP - 5M - Flowchart - Methods of analysis and problem solving

4 / What is he an engineer involved in a quality approach?

Decollaboration direct objects with a quality manager - topics that relate directly to the engineer

Goals

- Open to students issues, forms and tools of quality management
 - Know the "commun" tools quality approach
 - Encourage collaboration among future engineers and quality managers who hire entreprises

Bibliography

"Maîtriser les processus de l'entreprise - Guide opérationnel" - Michel CATTAN, Nathalie IDRISSE, Patrick KNOCKAERT, 3 édition, Editions d'Organisation

"Méthodes et outils pour résoudre un problème" 45 outils pour améliorer la performance de votre organisation - Alain-Michel CHAUVET, 3 édition, DUNOD

Prerequisites

- Discover the world of entreprise through an internship and / or project
 - Ability to project in the engineering profession
(see Module Discovery trades and entreprise 3rd year)

Learning outcomes

Learning outcomes	N	A	M	E	O
• Understand the organization of a company in a point of view "process"	✓
• Handle "commun" tools quality through analysis and problem solving	.	✓	.	.	.
• Know the principles of continuous improvement	✓
• Understand the organization of a company in a point of view "process"	✓
• Handle "commun" tools quality through analysis and problem solving	.	✓	.	.	.
• Know the principles of continuous improvement	✓
• Understand the organization of a company in a point of view "process"	✓
• Handle "commun" tools quality through analysis and problem solving	.	✓	.	.	.
• Know the principles of continuous improvement	✓
• Understand the organization of a company in a point of view "process"	✓
• Handle "commun" tools quality through analysis and problem solving	.	✓	.	.	.
• Know the principles of continuous improvement	✓
• Understand the organization of a company in a point of view "process"	✓
• Handle "commun" tools quality through analysis and problem solving	.	✓	.	.	.
• Know the principles of continuous improvement	✓
• Understand the organization of a company in a point of view "process"	✓
• Handle "commun" tools quality through analysis and problem solving	.	✓	.	.	.
• Know the principles of continuous improvement	✓
• Understand the organization of a company in a point of view "process"	✓
• Handle "commun" tools quality through analysis and problem solving	.	✓	.	.	.
• Know the principles of continuous improvement	✓
• Understand the organization of a company in a point of view "process"	✓
• Handle "commun" tools quality through analysis and problem solving	.	✓	.	.	.
• Know the principles of continuous improvement	✓
• Understand the organization of a company in a point of view "process"	✓
• Handle "commun" tools quality through analysis and problem solving	.	✓	.	.	.
• Know the principles of continuous improvement	✓
• Understand the organization of a company in a point of view "process"	✓
• Handle "commun" tools quality through analysis and problem solving	.	✓	.	.	.
• Know the principles of continuous improvement	✓
• Understand the organization of a company in a point of view "process"	✓

Quantitative physiology

Hours

Lect	Tut	PW	Proj	WP	Asst
15	10				10

Evaluation

One evaluation : *Examen écrit*

Rheology

Hours

Lect	Tut	PW	Proj	WP	Asst
5	5	4			5

Evaluation

One evaluation : *CC*

Manager : El-Khider SI-AHMED

Safety Health at Work

Hours

Lect	Tut	PW	Proj	WP	Asst
	10.5				5

Evaluation

One evaluation : *Contrôle continu*

Outline

General information on occupational risks (defined AT / MP / risks / hazards, pricing, direct and indirect costs, statistics, internal and external actors)

Regulatory framework Law 1991 - prevention principles, guidelines, laws, decrees,

Penal and civil responsibility: roles and responsibilities of an engineer in the prevention of occupational risks, delegation of power

Different hazards and their sources in company

Evaluation of occupational hazards applied to a work situation, risks document

Definition and implementation of preventive and / or corrective actions

Work accident : mechanisms, analysis

Bibliography

www.inrs.fr

sites des carsat

www.legifrance.gouv.fr

code permanent hygiène et sécurité

<http://www.travailler-mieux.gouv.fr/>

Learning outcomes

Learning outcomes	N	A	M	E	O
• Know their rights and obligations under the internship and future employment	•	✓	•	•	•
• Identify the risks of infringement with the health on a workstation and propose adapted prevention measures	•	✓	•	•	•
• Know the regulations relative to the hygiene and the safety at work	✓	•	•	•	•
• Prepare the student to think of an issue of health and safety at work to apprehend in its future projects	•	✓	•	•	•
• Know their rights and obligations under the internship and future employment	•	✓	•	•	•
• Identify the risks of infringement with the health on a workstation and propose adapted prevention measures	•	✓	•	•	•
• Know the regulations relative to the hygiene and the safety at work	✓	•	•	•	•
• Prepare the student to think of an issue of health and safety at work to apprehend in its future projects	•	✓	•	•	•
• Know their rights and obligations under the internship and future employment	•	✓	•	•	•
• Identify the risks of infringement with the health on a workstation and propose adapted prevention measures	•	✓	•	•	•
• Know the regulations relative to the hygiene and the safety at work	✓	•	•	•	•
• Prepare the student to think of an issue of health and safety at work to apprehend in its future projects	•	✓	•	•	•
• Know their rights and obligations under the internship and future employment	•	✓	•	•	•
• Identify the risks of infringement with the health on a workstation and propose adapted prevention measures	•	✓	•	•	•
• Know the regulations relative to the hygiene and the safety at work	✓	•	•	•	•
• Prepare the student to think of an issue of health and safety at work to apprehend in its future projects	•	✓	•	•	•
• Know their rights and obligations under the internship and future employment	•	✓	•	•	•
• Identify the risks of infringement with the health on a workstation and propose adapted prevention measures	•	✓	•	•	•
• Know the regulations relative to the hygiene and the safety at work	✓	•	•	•	•
• Prepare the student to think of an issue of health and safety at work to apprehend in its future projects	•	✓	•	•	•
• Know their rights and obligations under the internship and future employment	•	✓	•	•	•
• Identify the risks of infringement with the health on a workstation and propose adapted prevention measures	•	✓	•	•	•
• Know the regulations relative to the hygiene and the safety at work	✓	•	•	•	•
• Prepare the student to think of an issue of health and safety at work to apprehend in its future projects	•	✓	•	•	•
• Know their rights and obligations under the internship and future employment	•	✓	•	•	•
• Identify the risks of infringement with the health on a workstation and propose adapted prevention measures	•	✓	•	•	•
• Know the regulations relative to the hygiene and the safety at work	✓	•	•	•	•

Second foreign language - Spanish

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Second foreign language - Spanish

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Sensors and Process Control

Hours

Lect	Tut	PW	Proj	WP	Asst
24	1	12	12		20

Evaluation

3 evaluations :

- *CC*
- *TP*
- *Projet*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Choix de capteurs pour le suivi de réacteurs/bioréacteurs	·	✓	·	·	·
• Acquisition de l'information et traitement du signal	·	·	✓	·	·
• Connaissance des principes des capteurs physiques-chimiques et biologiques	·	·	✓	·	·

Manager : Mariana TITICA

Sociology of innovation

Hours

Lect	Tut	PW	Proj	WP	Asst
4.5					4.5

Evaluation

One evaluation : *Contrôle continu*

Outline

Innovation (organization, development, industrial property, project's driving (steering)).

Goals

Global definition "Innovation". Acquire knowledges : the innovation global process. Create a project (non-existent product) (team)

Bibliography

Créativité et Innovation Tayeb Louafa et Francis-Luc Perret (éditions presse polytechniques et universitaires romandes).

La boîte à outils de l'innovation de Géraldine Benoit-Vervantes (éditions Dunod).

Prerequisites

None

Manager : Dominique PECAUD

Sport 1

Hours

Lect	Tut	PW	Proj	WP	Asst
	19.5				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.

Manager : Jérôme BEZIER

Sport 2

Hours

Lect	Tut	PW	Proj	WP	Asst
	19.5				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.

Manager : Jérôme BEZIER

Sport 3

Hours

Lect	Tut	PW	Proj	WP	Asst
	19.5				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.

Manager : Jérôme BEZIER

Sport 4

Hours

Lect	Tut	PW	Proj	WP	Asst
	19.5				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.
• Favoriser l'équilibre physique et psychique des élèves	.	.	✓	.	.
• Etre capable de travailler en équipe, de communiquer et d'établir des relations de confiance et d'entraide	.	✓	.	.	.
• Résister au stress et évacuer les tensions liées aux études	.	.	✓	.	.
• Capacité à prendre des initiatives, mise en action, adaptation à un contexte et/ou consigne (dans un contexte nouveau)	.	.	✓	.	.

Manager : Jérôme BEZIER

Statistics and Probability

Hours

Lect	Tut	PW	Proj	WP	Asst
10	12				11

Evaluation

One evaluation : *CC*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Savoir transcrire une problématique non déterministe dans le langage probabiliste	.	.	✓	.	.
• Savoir estimer des paramètres à partir d'observations sur des populations statistiques	.	.	✓	.	.

Manager : Laurence MIEGEVILLE

Stirring and mixing

Hours

Lect	Tut	PW	Proj	WP	Asst
8					2

Evaluation

One evaluation : *Examen*

Manager : Caroline GENTRIC

Sustainable development

Hours

Lect	Tut	PW	Proj	WP	Asst
	10.5				10.5

Evaluation

One evaluation : *Livable+SO+CC*

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- Sylvie BRUNEL; « Le développement durable »; Presses Universitaires de France, 2004, Que sais-je ?
- Dominique BOURG, Gilles-Laurent RAYSSAC; « Le développement durable, maintenant ou jamais »; Gallimard, 2007
- Gérard GRANIER, Yvette VEYRET; « Développement durable, quels enjeux géographiques? »; La documentation française, 2006
- Catherine AUBERTIN, Franck-Dominique VIVIEN; « Le développement durable, enjeux politiques, économiques et sociaux »; La documentation française, 2006

Learning outcomes

Learning outcomes	N	A	M	E	O
• Understand the concepts of sustainable development	•	✓	•	•	•
• Pay attention to environmental, social, economic issues	•	✓	•	•	•
• Become aware that professional choices have an impact in terms of sociological, political aspects	•	✓	•	•	•
• Be aware of laws and regulations relating to sustainable development	✓	•	•	•	•
• Understand the concepts of sustainable development	•	✓	•	•	•
• Pay attention to environmental, social, economic issues	•	✓	•	•	•
• Become aware that professional choices have an impact in terms of sociological, political aspects	•	✓	•	•	•
• Be aware of laws and regulations relating to sustainable development	✓	•	•	•	•
• Understand the concepts of sustainable development	•	✓	•	•	•
• Pay attention to environmental, social, economic issues	•	✓	•	•	•
• Become aware that professional choices have an impact in terms of sociological, political aspects	•	✓	•	•	•
• Be aware of laws and regulations relating to sustainable development	✓	•	•	•	•
• Understand the concepts of sustainable development	•	✓	•	•	•
• Pay attention to environmental, social, economic issues	•	✓	•	•	•
• Become aware that professional choices have an impact in terms of sociological, political aspects	•	✓	•	•	•
• Be aware of laws and regulations relating to sustainable development	✓	•	•	•	•
• Understand the concepts of sustainable development	•	✓	•	•	•
• Pay attention to environmental, social, economic issues	•	✓	•	•	•
• Become aware that professional choices have an impact in terms of sociological, political aspects	•	✓	•	•	•
• Be aware of laws and regulations relating to sustainable development	✓	•	•	•	•
• Understand the concepts of sustainable development	•	✓	•	•	•
• Pay attention to environmental, social, economic issues	•	✓	•	•	•
• Become aware that professional choices have an impact in terms of sociological, political aspects	•	✓	•	•	•
• Be aware of laws and regulations relating to sustainable development	✓	•	•	•	•
• Understand the concepts of sustainable development	•	✓	•	•	•
• Pay attention to environmental, social, economic issues	•	✓	•	•	•
• Become aware that professional choices have an impact in terms of sociological, political aspects	•	✓	•	•	•
• Be aware of laws and regulations relating to sustainable development	✓	•	•	•	•
• Understand the concepts of sustainable development	•	✓	•	•	•
• Pay attention to environmental, social, economic issues	•	✓	•	•	•

Manager : Laurence CHARPENTIER

Systemic analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
12	14				9

Evaluation

One evaluation : *CC*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Analyser un système (paramètres, phénomènes, fonctionnement)	.	.	.	✓	.
• Modéliser une fonction de transfert, ajuster les paramètres du modèle sur une réponse expérimentale	.	.	✓	.	.
• Proposer une démarche expérimentale basée sur la distribution des temps de séjour pour diagnostiquer le fonctionnement d'un procédé	.	.	✓	.	.

Manager : Luc MARCHAL

Technical and Engineering Processes

Hours

Lect	Tut	PW	Proj	WP	Asst
12	10				8

Evaluation

One evaluation : *CC*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Lecture de schémas de procédés	.	.	✓	.	.
• Connaissance des grands schémas de production (chimie fine, chimie lourde, agroalimentaire, biotechnologies)	✓
• Bilans matière et énergétique	.	.	.	✓	.

Manager : Jean-Luc LEROY

Thermodynamic model

Hours

Lect	Tut	PW	Proj	WP	Asst
6	6	8			5

Evaluation

One evaluation : *Examen écrit*

Thermodynamics

Hours

Lect	Tut	PW	Proj	WP	Asst
14	15				15

Evaluation

2 evaluations :

- *Contrôle continu*
- *Examen*

Training for Toeic

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Training for Toeic

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *Théorie*

Turbulence

Hours

Lect	Tut	PW	Proj	WP	Asst
8	8	4			11

Evaluation

2 evaluations :

- *CC*
- *TP/projet*

Manager : El-Khider SI-AHMED

Waste treatment/Water treatment

Hours

Lect	Tut	PW	Proj	WP	Asst
6	6				4

Evaluation

One evaluation : *Examen écrit*

Work analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
	12				4

Evaluation

One evaluation : *Contrôle continu*

Bibliography

Cf liste des ressources mises à disposition des étudiants pour répondre aux questions, entre autre :

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- Management Humain, Taskin L. et Dietrich A., De Boeck Supérieur, 2016
- L'évaluation du travail à l'épreuve du réel : critique des fondements de l'évaluation, 1995
- L'acteur et le système, Michel Crozier, Erhard Friedberg, Points (dernière édition 2014)

Learning outcomes

Learning outcomes	N	A	M	E	O
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.
• 1	.	✓	.	.	.
• 2	.	✓	.	.	.

Manager : Anouk GREVIN

Working Law

Hours

Lect	Tut	PW	Proj	WP	Asst
	10.5				10.5

Evaluation

One evaluation : *Contrôle continu*

Presentation

Course to explore and analyze complexity and opportunities of french working law.

Outline

1 / Introduction, concept and main legal tools 2/ Part 1 : workers legal systems 3/ Part 2 : enterprise legal systems 4 / conclusion and discussion on legal approaches

Goals

Describing, exploring and analysing legal informations and especially business legal systems.

Bibliography

le droit des sociétés en question, dcg2, gualino (2013) & www.legifrance.gouv.fr

Prerequisites

No

Manager : Marc BIDAN

Worksheets and Databases

Hours

Lect	Tut	PW	Proj	WP	Asst
8	1.5	12			8

Evaluation

One evaluation : *Examen écrit*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Manipuler efficacement les fichiers Excel? (filtres, rapports automatiques, macros)	.	.	✓	.	.
• Création de base de données Access? et extraction de données dans Excel?	.	.	✓	.	.

Manager : Carole CASTAGLIOLA