Teaching program

Génie Civil

Academic year 2022-2023

Ecole polytechnique de Nantes Université

September 14, 2022

Contents

Part I

Tables of teaching units

Semester 5 - unit *GC 3*

Mechanics of Solids and Structures — ECTS : 10

Manager : BIGNONNET François

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Continuum Mechanics	17.5	20.25				16	*3*
• Mechanics of Structures 1	10	34.25	12			25	*4.5*
• Structural safety and calculation	11.25	12.75				11	*2.5*
TOTAL	38.75	67.25	12	0	0	52	

Reception — ECTS : 1.5

Manager : BIGNONNET François

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
1 opt ▷ Construction and topography		18.75	8			15	*1.5*
1 opt ▷ Applied mathematics		18.75	8			15	*1.5*
TOTAL	0	18.75	8	0	0	15	

Materials and Eco-conception — ECTS : 5

Manager : BIGNONNET François

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Eco-building : materials and concepts	10	9				15	*2*
• Civil engineering materials and durability	16.25	6.5	12			15	*3*
TOTAL	26.25	15.5	12	0	0	30	

Humanities and professional issues 1 — ECTS : 8

Manager : OILI Luc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• History, business knowledge and entrepreneurship	15	15				4	*20*
• Physical education and sport 1		21				2	*20*
• Professionnal project 1	1.5	16.5				4.5	*20*
• Sustainable development and social responsability 1			6				*5*
• Grammar and professional English 1		40					*35*
TOTAL	16.5	92.5	6	0	0	10.5	

Engineering tools and modelling ECTS : 5.5

Manager : BIGNONNET François

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Computer Science (algorithms and computers architecture)	6.25	7.75	5	6.25		6.25	*2.5*
• Statistics and Probability	17.5	14				12	*3*
TOTAL	23.75	21.75	5	6.25	0	18.25	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	105.25	215.75	43	6.25	0	125.75	30
Face-to-face sum	370.25						

Semester 6 - unit *GC 3*

Humanities and professional issues 2 — ECTS : 8

Manager : OILI Luc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Accounting business game		12	12			5	*13*
• Physical education and sport 2		21				2	*13*
• Soft skills		7.5					*13*
• Project management 1	4.5		3			2	*13*
• Socio-economic debates		18				10	*13*
• Grammar, Toeic and professional English 2		39	2				*35*
TOTAL	4.5	97.5	17	0	0	19	

Applied Physics — ECTS : 7.5

Manager : BIGNONNET François

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Acoustics	6.25	6.5				8	*1*
• Electricity and protection in buildings	1.25	10.75				8	*1*
• Fluids Mechanics	15	16.5	8			20	*2.5*
• Thermodynamics and thermal sciences	17.5	19	8			24	*3*
TOTAL	40	52.75	16	0	0	60	

Building Conception and Safety — ECTS : 3.5

Manager : BIGNONNET François

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• An introduction to architecture		1		10		4	*1*
• Computer tools for Civil Engineering (CAD, BIM and GIS)	2.5		20			8	*1.5*
• Prevention of risks	3.75	9				5	*1*
TOTAL	6.25	10	20	10	0	17	

Structure and Soils — ECTS : 9

Manager : BIGNONNET François

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Reinforced concrete	18.75	21.5	16	18		20	*5*
• Soil mechanics	13.75	17.75	16			23	*3*
• Mechanics of Structures 2	3.75	12.75				6	*1*
TOTAL	36.25	52	32	18	0	49	

Training period GC3 ECTS : 2

Manager : BENDAHMANE Fateh

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Training period GC3					8		*1*
TOTAL	0	0	0	0	8	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	87	212.25	85	28	8	145	30
Face-to-face sum	412.25						

Semester 7 - unit *GC 4*

Structure and geotechnical — ECTS : 7

Manager : BENDAHMANE Fateh

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Reinforced and pre-stressed concrete	16.25	17.75		16		30	*3.5*
• Geotechnical engineering	17.5	20.25	8			25	*3.5*
TOTAL	33.75	38	8	16	0	55	

Heating and air-conditioning systems — ECTS : 7

Manager : ENEE Anne-Sophie

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Building energy	15	20.25	4			21	*3*
• Project on HVAC systems				16		10	*1.5*
• Ventilation - air conditioning	12.5	16.5	4			17	*2.5*
TOTAL	27.5	36.75	8	16	0	48	

Humanities and professional issues 3 — ECTS : 7

Manager : OILI Luc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Business analysis	4.5	6				3	*15*
• Physical education and sport 3		21				2	*10*
• Negotiations	3	7.5				2	*10*
• Quality, security and environmental approaches (QSE1)		4.5	3				*10*
• Professionnal project 2		6				6	*10*
• Professional English 3		19	2				*26.25*
• Circular economy	4.5	3				6	*10*
1 opt ▷ Continuous Assessment (bis)							*8.75*
1 opt ▷ French as a Foreign Language for engineering students		18					*8.75*
1 opt ▷ Second foreign language - German		18					*8.75*
1 opt ▷ Second foreign language - Chinese		18					*8.75*
1 opt ▷ Second foreign language - Spanish		18					*8.75*
1 opt ▷ Second foreign language - Japanese		18					*8.75*
1 opt ▷ Training for Toeic		18					*8.75*
1 opt ▷ Second foreign language - Sign language		18					*8.75*
TOTAL	12	85	5	0	0	19	

Structures analysis — ECTS : 7

Manager : BIGNONNET François

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Timber construction 1	10	15.25	4			16	*2*
• Non linear mechanics	10	14				12	*2*
• Numerical methods	15	15.25		8		15	*3*
TOTAL	35	44.5	4	8	0	43	

Course teaching unit S7 ECTS : 2

Manager : ISSAADI Nabil

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• 3A Internship Assesment							*50*
1 opt ▷ Research S7				32			*50*
1 opt ▷ Entrepreneurship S7				32			*50*
1 opt ▷ Interdiscipinary S7				32			*50*
1 opt ▷ Ecological and Social Transition S7				32			*50*
TOTAL	0	0	0	32	0	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	108.25	204.25	25	72	0	165	30
Face-to-face sum	409.5						

Semester 8 - unit *GC 4*

Humanities and professional issues 4 — ECTS : 6

Manager : OILI Luc

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Critical approaches of the firm		9				3	*13*
• Physical education and sport 4		21				2	*13*
• Professional Project 3		12				5	*13*
• Sustainable development and social responsability 2	1.5	9				10	*13*
• Intercultural explorations		18					*17.5*
• Quality, security ant environmental approaches (QSE2)		7.5					*13*
1 opt ▷ Continuous Assessment(bis)							*17.5*
1 opt ▷ French as a Foreign Language for engineering students		18					*17.5*
1 opt ▷ Second foreign language - German		18					*17.5*
1 opt ▷ Second foreign language - Chinese		18					*17.5*
1 opt ▷ Second foreign language - Spanish		18					*17.5*
1 opt ▷ Second foreign language - Japanese		18					*17.5*
1 opt ▷ Training for Toeic		18					*17.5*
1 opt ▷ Second foreign language - Sign language		18					*17.5*
TOTAL	1.5	94.5	0	0	0	20	

Advanced design in Civil Engineering — ECTS : 6

Manager : AMIRI Ouali

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Steel Structures	17.5	19		32		15	*4*
• Structural dynamics	11.25	14	8			16	*2*
TOTAL	28.75	33	8	32	0	31	

Construction project management — ECTS : 5

Manager : LAIGLE Stéphane

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Construction project management	17.5	19		20		20	*3.5*
• Finishing work	7.5			16		12.5	*1.5*
TOTAL	25	19	0	36	0	32.5	

Urban planning and sustainable construction — ECTS : 6

Manager : LAIGLE Stéphane

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Urban planning	10	1.5	4	16		12	*2*
• Eco-construction : Life Cycle Analysis	15	1.5	12			15	*2*
• Construction pathology	15	1				6	*1*
• Highway Engineering	8.75	9				8	*1*
TOTAL	48.75	13	16	16	0	41	

Speciality internship **ECTS : 5**

Manager : BENDAHMANE Fateh

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Training period GC4					8		*1*
TOTAL	0	0	0	0	8	0	

Course teaching unit **ECTS : 2**

Manager : BENDAHMANE Fateh

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
1 opt ▷ Research S8				32			*100*
1 opt ▷ Entrepreneurship S8				32			*100*
1 opt ▷ Interdisciplinary S8				32			*100*
1 opt ▷ Ecological and Social Transition S8				32			*100*
TOTAL	0	0	0	32	0	0	

Sum of semester

	Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	104	159.5	24	116	8	124.5	30
Face-to-face sum	403.5						

Semester 9 - unit *GC5 Bâtiment/Eco*

Humanities and professional issues 5 ECTS : 4

Manager : OILI Luc

Course		Lect	Tut	PW	Proj	WP	Asst	*Coef*
• People and team management			10.5				6	*30*
• Professional project 4			12				2	*5*
• Project management 2			15				3	*35*
• Designing the tomorrow's management		3	6				3	*30*
▷ Training for TOEIC - s9			15					*0*
TOTAL	min	3	43.5	0	0	0	14	
	max	3	58.5	0	0	0	14	

Option Bâtiment-Éco construction ECTS : 12

Manager : ENEE Anne-Sophie

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Building ,environment and health	22.5	1.5	4			15	*17.5*
• Timber construction 2	16	13.75				15	*20*
• Steel-concrete construction	8.75	10.25		8		8	*17.5*
• Eco-conception	12.5	6.5		24		5	*25*
• Maintenance of buildings	24.5	7.5				10	*20*
TOTAL	84.25	39.5	4	32	0	53	

Structure and sustainable construction ECTS : 7

Manager : ENEE Anne-Sophie

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Design and realisation of bridges	16	9.5	4			15	*30*
• Sustainable developpement in civil engineering	18.75					8	*15*
• Earthquake engineering	12.5	17.25				15	*30*
• Scientific et technical research	10	2		12		12	*25*
TOTAL	57.25	28.75	4	12	0	50	

Transversal engineering ECTS : 7

Manager : AMIRI Ouali

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Advanced BIM		8		20		10	*25*
• Civil engineering project	8			42		20	*60*
• 4A internship assesment						20	*15*
TOTAL	8	8	0	62	0	50	

Sum of semester

		Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	min	152.5	119.75	8	106	0	167	30
	max	152.5	134.75	8	106	0	167	
Face-to-face sum		386.25 à 401.25						

Semester 9 - unit *GC5 Bâtiment/Eco (ContratPro)*

Humanities and professional issues 5 — ECTS : 4

Manager : OILI Luc

Course		Lect	Tut	PW	Proj	WP	Asst	*Coef*
• People and team management			10.5				6	*30*
• Professional project 4			12				2	*5*
• Project management 2			15				3	*35*
• Designing the tomorrow's management		3	6				3	*30*
▷ Training for TOEIC - s9			15					*0*
TOTAL	min	3	43.5	0	0	0	14	
	max	3	58.5	0	0	0	14	

Option Bâtiment-Éco construction — ECTS : 12

Manager : ENEE Anne-Sophie

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Building ,environment and health	22.5	1.5	4			15	*17.5*
• Timber construction 2	16	13.75				15	*20*
• Steel-concrete construction	8.75	10.25		8		8	*17.5*
• Eco-conception	12.5	6.5		24		5	*25*
• Maintenance of buildings	24.5	7.5				10	*20*
TOTAL	84.25	39.5	4	32	0	53	

Structure and sustainable construction - Contrat pro — ECTS : 7

Manager : ENEE Anne-Sophie

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Design and realisation of bridges	16	9.5	4			15	*37.5*
• Sustainable developpement in civil engineering	18.75					8	*25*
• Earthquake engineering	12.5	17.25				15	*37.5*
TOTAL	47.25	26.75	4	0	0	38	

Transversal engineering - Contrat pro — ECTS : 7

Manager : AMIRI Ouali

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Advanced BIM		8		20		10	*25*
• Civil engineering projet - CP	8			35		20	*60*
• 4A internship assesment						20	*15*
TOTAL	8	8	0	55	0	50	

Sum of semester

		Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	min	142.5	117.75	8	87	0	155	30
	max	142.5	132.75	8	87	0	155	
Face-to-face sum		355.25 à 370.25						

Semester 9 - unit *GC5 Génie Urbain*

Humanities and professional issues 5 — ECTS : 4

Manager : OILI Luc

Course		Lect	Tut	PW	Proj	WP	Asst	*Coef*
• People and team management			10.5				6	*30*
• Professional project 4			12				2	*5*
• Project management 2			15				3	*35*
• Designing the tomorrow's management		3	6				3	*30*
▷ Training for TOEIC - s9			15					*0*
TOTAL	min	3	43.5	0	0	0	14	
	max	3	58.5	0	0	0	14	

Option Génie Urbain — ECTS : 12

Manager : ENEE Anne-Sophie

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Advanced urban planning	12	13.5				12	*15*
• Town and coast planning in the face of climate changes	24	9.5	4			21	*30*
• Intelligent management of energy, water and waste	18.5	12				12	*15*
• Transportation engineering and smart mobility	28	27	4	8		30	*40*
TOTAL	82.5	62	8	8	0	75	

Structure and sustainable construction — ECTS : 7

Manager : ENEE Anne-Sophie

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Design and realisation of bridges	16	9.5	4			15	*30*
• Sustainable developpement in civil engineering	18.75					8	*15*
• Earthquake engineering	12.5	17.25				15	*30*
• Scientific et technical research	10	2		12		12	*25*
TOTAL	57.25	28.75	4	12	0	50	

Transversal engineering — ECTS : 7

Manager : AMIRI Ouali

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Advanced BIM		8		20		10	*25*
• Civil engineering project	8			42		20	*60*
• 4A internship assesment						20	*15*
TOTAL	8	8	0	62	0	50	

Sum of semester

		Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	min	150.75	142.25	12	82	0	189	30
	max	150.75	157.25	12	82	0	189	
Face-to-face sum		387 à 402						

Semester 9 - unit *GC5 Génie Urbain (ContratPro)*

Humanities and professional issues 5 — ECTS : 4

Manager : OILI Luc

Course		Lect	Tut	PW	Proj	WP	Asst	*Coef*
• People and team management			10.5				6	*30*
• Professional project 4			12				2	*5*
• Project management 2			15				3	*35*
• Designing the tomorrow's management		3	6				3	*30*
▷ Training for TOEIC - s9			15					*0*
TOTAL	min	3	43.5	0	0	0	14	
	max	3	58.5	0	0	0	14	

Option Génie Urbain — ECTS : 12

Manager : ENEE Anne-Sophie

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Advanced urban planning	12	13.5				12	*15*
• Town and coast planning in the face of climate changes	24	9.5	4			21	*30*
• Intelligent management of energy, water and waste	18.5	12				12	*15*
• Transportation engineering and smart mobility	28	27	4	8		30	*40*
TOTAL	82.5	62	8	8	0	75	

Structure and sustainable construction - Contrat pro — ECTS : 7

Manager : ENEE Anne-Sophie

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Design and realisation of bridges	16	9.5	4			15	*37.5*
• Sustainable developpement in civil engineering	18.75					8	*25*
• Earthquake engineering	12.5	17.25				15	*37.5*
TOTAL	47.25	26.75	4	0	0	38	

Transversal engineering - Contrat pro — ECTS : 7

Manager : AMIRI Ouali

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Advanced BIM		8		20		10	*25*
• Civil engineering projet - CP	8			35		20	*60*
• 4A internship assesment						20	*15*
TOTAL	8	8	0	55	0	50	

Sum of semester

		Lect	Tut	PW	Proj	WP	Asst	ECTS
Sum	min	140.75	140.25	12	63	0	177	30
	max	140.75	155.25	12	63	0	177	
Face-to-face sum		356 à 371						

Semester 10 - unit *GC5*

Training period 3 ECTS : 30

Manager : ENEE Anne-Sophie

Course	Lect	Tut	PW	Proj	WP	Asst	*Coef*
• Training period 3							*100*
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							

Part II

Sheets of courses

3A Internship Assesment

Hours

Lect Tut PW Proj WP Asst

Evaluation

One evaluation : *Rapport*

Manager : Bruno AUVITY

Accounting business game

Hours

Lect	Tut	PW	Proj	WP	Asst
	12	12			5

Evaluation

One evaluation : *Soutenance + CC*

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	·	✓	·	·	·

Manager : Chrystèle GONCALVES

Acoustics

Hours

Lect	Tut	PW	Proj	WP	Asst
6.25	6.5				8

Evaluation

One evaluation : *devoir surveillé*

Outline

1. Basics for architectural acoustic
   - Physiological acoustics
   - Physical bases : sound power, intensity, sound pressure level, frequency, sounds
   - Interior space acoustics (reverberation)
   - Inter space noise control (acoustic transmission)
   2. Lighting
   - Light, eye and vision
   - Photometric quantities
   - Light sources : lamp types and luminaires
   - Street lighting : design, energy efficiency

Goals

Basics for understanding phenomena in acoustics and in street lighting.

Bibliography

A. Fischetti ; « Initiation à l'acoustique » ; 2003

M. Val ; « Acoustique appliquée - Aide-mémoire de l'ingénieur » ; Dunod, 2002

Association française d'éclairage ; « Recommandations relatives à l'éclairage des voies publiques » ; 2002

I.Arnaud (ADEME) ; « Eclairer juste »; 2010

Prerequisites

None

Learning outcomes

Learning outcomes	N	A	M	E	O
• Understanding and use of physical quantities of lighting and acoustics.	·	·	✓	·	·
• Bases for the design of street ligthing.	✓	·	·	·	·
• Propose solutions to reduce reverberation time of a room.	·	✓	·	·	·
• Propose solutions to reduce acoustic transmission between two rooms or between a local and the external environment.	·	✓	·	·	·

Manager : Anne-Sophie ENEE

Advanced BIM

Hours

Lect	Tut	PW	Proj	WP	Asst
	8		20		10

Evaluation

2 evaluations :

- *Soutenance*
- *QCM*

Bibliography

Guide méthodologique convention BIM de Médiaconstruct
http://www.mediacontruct.fr
http://www.batiment-numérique.fr

Learning outcomes

Learning outcomes	N	A	M	E	O
• Design a digital model	·	·	✓	·	·
• Write a BIM agreement	✓	·	·	·	·
• Exploit a digital model	·	✓	·	·	·

Manager : Anne-Sophie ENEE

Advanced urban planning

Hours

Lect	Tut	PW	Proj	WP	Asst
12	13.5				12

Evaluation

2 evaluations :

- *Devoir surveillé*
- *Projet*

Learning outcomes

Learning outcomes	N	A	M	E	O
• Knowledge of urban planning processus	·	✓	·	·	·
• Understand and participate to urban planning in the futur	·	✓	·	·	·

Manager : Stéphane LAIGLE

An introduction to architecture

Hours

Lect	Tut	PW	Proj	WP	Asst
	1		10		4

Evaluation

One evaluation : *Devoir surveillé*

Bibliography

CHING Francis D. K., Architecture : form, space, and order, Copyright Material, 3e edition 2007 (1943)

GYMPEL Jan, Histoire de l'architecture de l'antiquité à nos jours, 2 volumes, Editions Konemann-Ellipsis, 1998

NEUFERT Ernest, Eléments des projets de construction, Editions du Moniteur (11e édition), 2014

PEREC Georges, Espèces d'espaces, Editions Galilée, 1974

Learning outcomes

Learning outcomes	N	A	M	E	O
• To understand architectural issues and relationships	·	✓	·	·	·
• To discover several ways to conceive architectural forms	✓	·	·	·	·
• To know the basic architectural vocabulary	·	·	✓	·	·
• To know few architectural references	·	·	✓	·	·

Manager : François BIGNONNET

Applied mathematics

Hours

Lect	Tut	PW	Proj	WP	Asst
	18.75	8			15

Outline

Linear Algebra

1. Algebraic structure : vector space
2. Linear Mapping
3. Matrix Calculus
4. Changing Basis
5. Practice on Linear differential equations

Real Analysis

1. Derivatives
2. Riemann Integral
3. Multiple Integral

Goals

For students coming from technological training, this course given at the very beginning of the engineering training come back on the basis of the real analysis and the linear algebra. The aim of lessons and practical works is to base the knowledge and the mastery of tecniques of calculus.

Bibliography

J.P.Nougier;«Méthodesdecalculnumérique»;Hermes

T.G.Beckwith;«Mechanicalmeasurements»;Addison-Wesleypublishingcompany

B.Demidovitch,I.Maron;«Elementsdecalculnumérique»;MIR

C.E.Gerald;«Appliednumericalanalysis»;Addison-Wesleypublishingcompany

Learning outcomes

Learning outcomes	N	A	M	E	O
• Knowing and mastering matrix modeling and associated tools	·	·	✓	·	·
• Mastering the technics of the calculus in real analysis	·	·	✓	·	·

Manager : Michel CARDELLI

Building ,environment and health

Hours

Lect	Tut	PW	Proj	WP	Asst
22.5	1.5	4			15

Evaluation

2 evaluations :

- *Devoir surveillé*
- *Soutenance*

Outline

1 Shares of the Environmental Impacts of buildings on the environment and buildings
2 Analogies between life and living environment, be human and building, medicine, and engineering
3 Characteristics of buildings dedicated to health
4 Conduct of projects involving building, environment and health
5. Integration of environmental and health aspects in the design and construction of buildings
6 Impact of the indoor environment of buildings on the health

Goals

Description of the actions of the environment on buildings, the impact of buildings on the environment, the similarities between life and living environment, impacts of the construction and the indoor environment of buildings on health, of high-quality environmental in the world and constructions of buildings dedicated to the health

Bibliography

Suzanne DEHOUX ; « Habitat Qualité Santé, Clefs En Main - Des Bâtiments respectant l'Homme et l'Environnement » « Guide de l'Habitat Sain »
-site : Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME)
-site : Ministère de l'Ecologie, de l'Energie, du Développement Durable et de la Mer, www.plan-batiment.legrenelle-environnement.fr
- site : Ministère de la Santé et des Sports, www.sante-sports.gouv.fr/deuxieme-plan-national-sante-environnement-pnse-2-2009-2013.html
-www.assohqe.org -www.minergie.fr/ -www.usgbc.org/leed/

Prerequisites

-Introduction to architecture
-Materials engineering and sustainability
-Security and stability of constructions

Learning outcomes

Learning outcomes	N	A	M	E	O
• Know the actions of the environment on the building	✓	·	·	·	·
• Understanding the impacts of buildings on the environment and the health of the occupants	✓	·	·	·	·
• Knowledge of design focusing on the health of occupants and the environment	✓	·	·	·	·

Manager : Didier HENNETIER

Building energy

Hours

Lect	Tut	PW	Proj	WP	Asst
15	20.25	4			21

Evaluation

3 evaluations :

- *Compte-rendu de TP*
- *Devoir surveillé*
- *Contrôle continu*

Outline

1 heat transfer & thermodynamics
2 Thermal Comfort
3 calculation déperditif buildings & thermal regulation
4 heat exchangers
4.1 Theory & design
4.2 technology
5 Heating
5.1 Energy Resources
5.2 Production Technology
5.3 distribution network and transmitters
6 refrigeration
6.1 cycles
6.2 Component Technology

Goals

The objective of this course is to provide the knowledge necessary for a civil engineer to understand the issues in building energy management (energy and mass transfer, consumption...) as well as the technologies used to address those (insulation, thermal system from production to emission ...). This global theme is common to this course and "building energy 2-air ventilation"

Bibliography

-RECKNAGEL Hermann; « Le Recknagel, génie climatique »; Dunod, 2013
- J. Bouteloup; « Production de chaud et de froid »; Editions parisiennes, 1997
- Dal Zotto, Larre, Merlet, Picau; « Memotech : génie énergétique »; casteilla, 2014
- Fanger; « Thermal confort analysis and application »; 1982
- site web officiel www.rt-batiment.fr
- Jean-Pierre Oliva, Samuel Courgey; "L'isolation thermique écologique"

Prerequisites

fluid mechanics
thermodynamics - heat transfer

Learning outcomes

Learning outcomes	N	A	M	E	O
• to know the basics of thermal comfort	·	✓	·	·	·
• to calculate the heat loss of a building	·	✓	·	·	·
• to know the french energy regulation for buildings	·	✓	·	·	·
• to Know the different techniques and elements of a heating system	·	✓	·	·	·
• to design a heating water system and associated transmitters	·	✓	·	·	·
• to know the basics design and technology of refrigeration	·	✓	·	·	·

Manager : Christophe JOSSET

Business analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
4.5	6				3

Evaluation

One evaluation : *Etude de cas+QCM*

Bibliography

- A de Baynast, J Lendrevie, J Levy; Mercator"; Dunod. Dernières éditions
- F Canart ; Management de la qualité ; Gualino L Extenso Editions
- Henri Mintzberg, Structure et dynamique des organisations (Éd. d'organisation)
- M.Crozier ; A quoi sert la sociologie des organisations (Éd. Seli Arslan)
- S. Robbins, D. DeCenzo, M. Coulter ; Management, l'essentiel des concepts et des pratiques (9ème éd) Ed. Pearson
- https://www.l-expert-comptable.com/dossiers/evaluer-l-entreprise-reprendre-grace-l-analyse-economique.html
- https://www.fao.org/capacity-development/resources/practical-tools/analyse-organizational-performance/fr/

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-4	✓	·	·	·	·

Manager : Gwenael THOREL

Circular economy

Hours

Lect	Tut	PW	Proj	WP	Asst
4.5	3				6

Evaluation

One evaluation : *Diagnostic*

Bibliography

- AUREZ Vincent, GEORGEAULT Laurent, Economie circulaire, de Boeck
- Cf bibliographie donnée pendant le cours

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-3	✓	·	·	·	·

Manager : Chrystèle GONCALVES

Civil engineering materials and durability

Hours

Lect	Tut	PW	Proj	WP	Asst
16.25	6.5	12			15

Evaluation

2 evaluations :

- *Devoir surveillé*
- *Rapport de TP*

Outline

1. Cementitious materials
   - The main constituents
   - Behavior at an early age
   - The hardened concrete
   - Formulation of concrete
   - Pathologies of concrete 2. Materials in Civil Engineering
   - Wood
   - Steel
   - Plaster, lime etc. ..

Goals

The main civil engineering materials will be addressed by a physico-chemical and mechanical.

Bibliography

Adam M. Neville ; « Propriétés des bétons » ; Eyrolles, 2000

J. Baron et J.P. Ollivier ; « Les bétons : bases et données pour leur formulation » ; Eyrolles, 1997

collectif ; « Compactage des enrobés hydrocarbonés à chaud - Guide technique du laboratoire central des ponts et chaussées » ; 2003

G. Jeuffroy et R. Sauterey ; « Couches de roulement » ; Presses de l'Ecole nationale des ponts et chaussées, 1985

Prerequisites

Notions of RDM and chemistry

Learning outcomes

Learning outcomes	N	A	M	E	O
• Well knowing of Civil Engineering materials	·	·	✓	·	·
• Mechanical behaviour of Civil Engineering materials	·	·	✓	·	·
• Pratical Concrete formulation	·	·	✓	·	·
• Material Diagnosis	✓	·	·	·	·

Manager : Stéphanie BONNET

Civil engineering project

Hours

Lect	Tut	PW	Proj	WP	Asst
8			42		20

Evaluation

3 evaluations :

- *Lean (QCM)*
- *Projet Rapport*
- *Projet Oral*

Outline

1. Simulation and/or experimental study
2. Analysis
3. Applications, development, innovation

Goals

The objective of this teaching unit is to develop and widen research and innovation skills of civil engineering students including research project management. Other goals are to develop their interest in innovation and allowing them to discover links between engineering and research.

Prerequisites

Initiation to research

Learning outcomes

Learning outcomes	N	A	M	E	O
• Simulation and/or experimental study in research and development	·	·	✓	·	·
• Analysis of suggested methods for given topics	·	·	✓	·	·
• Application of research related to development and innovation	·	·	✓	·	·

Manager : Ouali AMIRI

Civil engineering projet - CP

Hours

Lect	Tut	PW	Proj	WP	Asst
8			35		20

Evaluation

3 evaluations :

- *Lean QCM*
- *Projet rapport*
- *Projet oral*

Outline

1. Simulation and/or experimental study
2. Analysis
3. Applications, development, innovation

Goals

The objective of this teaching unit is to develop and widen research and innovation skills of civil engineering students including research project management. Other goals are to develop their interest in innovation and allowing them to discover links between engineering and research.

Prerequisites

Initiation to research

Learning outcomes

Learning outcomes	N	A	M	E	O
• Simulation and/or experimental study in research and development	·	·	✓	·	·
• Analysis of suggested methods for given topics	·	·	✓	·	·
• Application of research related to development and innovation	·	·	✓	·	·

Manager : Ouali AMIRI

Computer Science (algorithms and computers architecture)

Hours

Lect	Tut	PW	Proj	WP	Asst
6.25	7.75	5	6.25		6.25

Evaluation

2 evaluations :

- *DS*
- *Projet*

Outline

1. Introduction : from abacus to modern computer
   a. A little bit of history
   b. Computer architecture and operating systems
   2. Algorithmic and data structures
   a. Variables, instructions and statements
   b. Control structures (conditions, loops, functions, etc.)
   c. Data structures (strings, arrays, lists, trees, etc.)
   d. Top-down analysis of a problem (iterative and recursive algorithms)
   3. From algorithmics to Python programming
   a. Python basics
   b. Python data structures

Goals

The objective of this course is to begin learning how to write algorithms and understand how a computer works. You will learn how to describe different kinds of problems using an algorithmic language. The practical part of the course will focus on letting students discover computer science by programming and testing simple algorithms on a computer.

Bibliography

Baynat, Chretienne et al ; « Exercices et problèmes d'algorithmique : 144 énoncés avec solutions détaillées » ; Dunod, juillet 2003, 464 pages, ISBN : 2100069586

Cormen, Leiserson, Rivest et al ; « Introduction à l'algorithmique : Cours et exercices (Broché) » ; Dunod, octobre 2002, 1146 pages, ISBN : 2100039229

Prerequisites

none

Learning outcomes

Learning outcomes	N	A	M	E	O
• Be able to write simple algorithms (e.g. using loops and simple data structures like lists)	·	✓	·	·	·
• Be able to write an algorithm using an array data structure (in one or more dimensions)	·	✓	·	·	·
• Be able to understand how a computer work and how its different parts interact with each other	✓	·	·	·	·

Manager : François BIGNONNET

Computer tools for Civil Engineering (CAD, BIM and GIS)

Hours

Lect	Tut	PW	Proj	WP	Asst
2.5		20			8

Evaluation

2 evaluations :

- *Note*
- *Compte rendu*

Outline

Technical drawing (DAO):
Introduction to technical drawing applied to Civil Engineering
Use of DAO software Autocad
Computer assisted design (CAO):
Presentation of the software and the different modules (reinforced concrete, wood and steel constructions)
Simulation of a beam subjected to a flexure.
Reinforcement of a column, a beam and foundation.
Modeling and analyse of a building in three dimensions

Goals

The objective of practical works is to initiate the students with the technical drawing (DAO) and structural modeling (CAO) by using software applying the European standards.

Bibliography

Normes NF P02-001, NF P02-005, NF P02-006
Initiation au dessin de bâtiment, Gerard Calvat
Lecture de plans de bâtiment, Henri Richaud, Bernard Vuillerme
Autocad 2011 - Des fondamentaux à la présentation détaillée, Olivier Le Frapper

Prerequisites

? Structure Mechanics
? Security et stability of constructions
? Reinforced concrete

Learning outcomes

Learning outcomes	N	A	M	E	O
• To learn the basics of the technical drawing applied to Civil Engineering	✓	·	·	·	·
• To use the basic functions of Autocad	·	✓	·	·	·
• Modeling of a 2D and 3D structure	·	✓	·	·	·
• Internal stress analysis	·	✓	·	·	·
• Reinforcement calculation	·	✓	·	·	·

Manager : Anne-Sophie ENEE

Construction and topography

Hours

Lect	Tut	PW	Proj	WP	Asst
	18.75	8			15

Evaluation

One evaluation : *Compte-rendu*

Outline

1. Construction: description of the constituent elements of a structure engineering. Infrastructures and superstructures, structural work, finishings. Construction principles of classical elements: foundations, bearing horizontal and vertical. 2. Topography: principles of implementing a work leveling. Using basic tools: level, theodolite and target.

Goals

For students with no knowledge in civil engineering, a module providing the basics of surveying and construction.

Bibliography

? H. Renaud et F. Letertre ; « Ouvrages en béton armé, technologie du bâtiment, gros-oeuvre » ; Foucher, 1994, isbn 2-216-03083-X

? A. Adrait et D. Sommier ; « Guide du constructeur en bâtiment » ; Hachette technique, 2002, isbn 2-01-16-8408-6

? Didier, Le Brazidec, Nataf, Thiesset ; « Précis Bâtiment » ; Nathan, 2002, isbn 2-09- 178940-2

? M. Bradant ; « Maîtriser la topographie » ; Eyrolles, 2003, isbn 2-212-11279-3

Prerequisites

None

Learning outcomes

Learning outcomes	N	A	M	E	O
• Learn vocabulary building	·	✓	·	·	·
• Know the basics of the topography	·	·	✓	·	·
• Read and produce a technical plan	·	✓	·	·	·

Manager : Anne-Sophie ENEE

Construction pathology

Hours

Lect	Tut	PW	Proj	WP	Asst
15	1				6

Evaluation

One evaluation : *Devoir surveillé*

Outline

Technical and economic consequences of damage to concrete structures. The physical and chemical causes.The main degradation modes. The hydrated cement paste. Permeabilities. The freeze-thaw cycles. The alkali-aggregate reaction. Action sulphate and seawater carbonation. Corrosion. Inspection techniques. Materials and repair techniques.

Goals

Understand the fundamental physicochemical mechanisms and environmental parameters that govern the durability of concrete and concrete structures. How to choose the characterization techniques in the laboratory and in situ and be able to interpret the results. Knowledge of materials and repair techniques and know when and how to use them.

Bibliography

? Guide du constructeur en bâtiment - Maîtriser l'ingénierie civile ; R. Adrait , D. Sommier , J.-P. Battail ; Editeur : Hachette

? Précis de bâtiment Conception, mise en oeuvre, normalisation ; J.-P. Trotignon, D. Didier, M. Le Brazidec, P. Nataf, J. Thiesset ; Collection : AFNOR-NATHAN ; novembre 2005

? Précis de Chantier Matériel et matériaux, mise en oeuvre, normalisation ; D. Didier, N. Girard, M. Le Brazidec, P. Nataf, R. Pralat, J. Thiesset ; Collection : AFNOR-NATHAN ; avril 2009

Prerequisites

none

Learning outcomes

Learning outcomes	N	A	M	E	O
• Know the main types of damage to buildings	·	·	✓	·	·

Manager : Nabil ISSAADI

Construction project management

Hours

Lect	Tut	PW	Proj	WP	Asst
17.5	19		20		20

Evaluation

3 evaluations :

- *Devoir surveillé*
- *Projet*
- *CR visite chantier*

Outline

1. Actors
2. The pieces of a market - MOP Law
3. The planning tools and Study of price
4. The temporal and spatial organization of a project

Goals

This is to enable future engineers fit into the overall process of making a book, from conception to realization, knowing the market organization. Synthesize the project around a schedule.

Bibliography

? Guide du constructeur en bâtiment - Maîtriser l'ingénierie civile ; R. Adrait , D. Sommier , J.-P. Battail ; Editeur : Hachette

? Précis de bâtiment Conception, mise en oeuvre, normalisation ; J.-P. Trotignon, D. Didier, M. Le Brazidec, P. Nataf, J. Thiesset ; Collection : AFNOR-NATHAN ; novembre 2005

? Précis de Chantier Matériel et matériaux, mise en oeuvre, normalisation ; D. Didier, N. Girard, M. Le Brazidec, P. Nataf, R. Pralat, J. Thiesset ; Collection : AFNOR-NATHAN ; avril 2009

Prerequisites

none

Learning outcomes

Learning outcomes	N	A	M	E	O
• Know the organization (parts and actors) a market	·	·	✓	·	·
• Realize the planning of an operation	·	·	✓	·	·
• Develop a plan of site installation	·	·	✓	·	·
• Realize a study of price	·	·	✓	·	·

Manager : Stéphane LAIGLE

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*

Continuum Mechanics

Hours

Lect	Tut	PW	Proj	WP	Asst
17.5	20.25				16

Evaluation

3 evaluations :

- *Contrôle continu*
- *Devoir surveillé*
- *Devoirs maison*

Outline

Introduction to tensors
Dynamics of three dimensional media, study of the stress tensor
Geometrical transformation, study of the linearized strain tensor
Elastic constitutive law
Direct and variationnal resolution of problems of elasticity

Goals

This course is an introduction to continuum mechanics. The dynamics of three dimensional continuous media is first studied to introduce the concept of stress tensor. The description of the geometrical transformation then allows to present the concept of strain. Finally, both concepts are gathered in the case of the linear elastic constitutive law. Both direct and variationnal methods of resolution of linear elastic problems are then tackled. The knowledge and the modelling procedure adopted in this course are at the heart of several applied disciplines (Structural analysis, Soil mechanics, Non-linear mechanics).

Bibliography

S.Forest - Mécanique des milieux continus. Cours de l'Ecole des Mines de Paris
L. Dormieux - Mécanique des milieux continus. Cours de l'Ecole des Ponts et Chaussées

Prerequisites

Tensor algebra (included in the course)
Linear algebra and Analysis
Newtonian mechanics

Learning outcomes

Learning outcomes	N	A	M	E	O
• Understanding the theoretical concepts of Continuum Mechanics for their use in the practical Civil Engineering disciplines.	·	·	✓	·	·

Manager : François BIGNONNET

Critical approaches of the firm

Hours

Lect	Tut	PW	Proj	WP	Asst
	9				3

Evaluation

One evaluation : *Exposé*

Bibliography

- Carney, B. M., & Getz, I. (2016). Freedom, Inc: How Corporate Liberation Unleashes Employee Potential and Business Performance. International Creative Management.

- Detchessahar, M. (2019). L'entreprise délibérée: refonder le management par le dialogue. Nouvelle cité.

- Dujarier, M.-A. (2017). Le management désincarné: enquête sur les nouveaux cadres du travail. La découverte.

- Gomez, P.-Y. (2013). Le travail invisible: enquête sur une disparition. Paris: F. Bourin.

- Les statuts juridiques de l'entreprise (Dessine-moi l'éco)

- Rendre le travail visible : la solution pour sortir de la crise (Dessine moi l'éco)

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-6	✓	·	·	·	·

Manager : Roland BESSENAY

Design and realisation of bridges

Hours

Lect	Tut	PW	Proj	WP	Asst
16	9.5	4			15

Evaluation

One evaluation : *Rapport*

Outline

1. The choice of a structure and its adaptation to the site.
2. Usual structures, prestressed structures, composite bridges, metal bridges, cable-stayed bridges, suspension bridges.
3. Pre-dimensioning of usual structures.
4. The different methodologies of construction and associated equipment.
5. Approach of costs (examples and ratios).

Goals

Different types of structures are described and the key elements of design are outlined. Conventional methods of construction are exposed.

Bibliography

Projet et construction des ponts. Généralités, fondations, appuis, ouvrages courants - CALGARO, JA-VIRLOGEUX, M-PRESSES DE L'ECOLE NATIONALE DES PONTS ET CHAUSSEES- 256p, dirr 120914-1991 Guide du projeteur ouvrages d'art : Ponts courant-SERVICE D'ETUDES TECHNIQUES DES ROUTES ET AUTOROUTES (SETRA)-1999 Conception des ponts - BERNARD-GELY,A CALGARO,JA - ENPC 1994

Prerequisites

Notions of resistance materials, reinforced concrete, prestressed concrete and steel construction

Learning outcomes

Learning outcomes	N	A	M	E	O
• Knowing the usual structures	·	·	✓	·	·
• Size the major components of a bridge	·	✓	·	·	·
• Justify a constructive mode	·	✓	·	·	·
• Produce a document execution methods	·	✓	·	·	·

Manager : Anne-Sophie ENEE

Designing the tomorrow's management

Hours

Lect	Tut	PW	Proj	WP	Asst
3	6				3

Evaluation

One evaluation : *Grille d'évaluation*

Bibliography

Partie don :

L'entreprise une affaire de don (Collectif, 2016)

Recevoir pour donner (Collectif, 2016)

Partie Jeux sérieux :

Theory of Fun for Game Design, Raph Koster, O'Reilly Media; Second edition, ISBN ? 978-1449363215

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	·	✓	·	·
• TPN-2	·	·	✓	·	·
• TPN-3	·	·	✓	·	·
• TPN-4	·	·	✓	·	·
• TPN-5	·	·	✓	·	·

Manager : Roland BESSENAY

Earthquake engineering

Hours

Lect	Tut	PW	Proj	WP	Asst
12.5	17.25				15

Evaluation

2 evaluations :

- *Devoir suveillé*
- *CR*

Outline

Static, transient and dynamic calculations
Dynamic loading/dynamic response
Earthquakes/Seismicity/Earthquake hazard
Experimental tools in Earthquake Engineering
Spatial discretization
Discrete systems with 1 ddl
Discrete systems with n ddl
Methods for spatial and transient discretization
The finite element methods in dynamics
Generalized elementary systems
Norms and legislation for earthquake engineering structures

Goals

The objectives of this course is to apprehend earthquake risk, to learn how to do dynamic calculations and how to study the dynamic behavior of a building, to understand the basic principles of earthquake engineering design and how to use Eurocode 8

Bibliography

- Dynamique des structures - Application aux ouvrages de génie civil, Patrick Paultre, Hermès, Lavoisier, 2004,
- Génie parasismique. Volumes I-II-III, Betbeder-Matibet , J., Hermes sciences publ., Lavoisier, 2003,
- Dynamics of Structures, Theory and Applications to Earthquake Engineering, Anil K. Chopra, second edition, Prentice-Hall, 2001.

Prerequisites

Structural mechanics
Structural Dynamics
Finite element method
Reinforced concrete

Learning outcomes

Learning outcomes	N	A	M	E	O
• Calculating a building submitted to an earthquake loading	·	✓	·	·	·
• Design of an earthquake resistant building	·	✓	·	·	·

Manager : Jérôme CLAVERIE

Eco-building : materials and concepts

Hours

Lect	Tut	PW	Proj	WP	Asst
10	9				15

Evaluation

2 evaluations :

- *Devoir surveillé*
- *Rapport de projet*

Outline

? Building and Sustainable Development
  ? Weight of the building sector
  ? Development of energy performance
  ? Diagnosis of energy performance
  ? Towards efficient buildings
  ? The glazings and joinery
  ? Building materials
  ? Renewable energy
  ? The bioclimatic design
  ? Waste Management and Recycling.

Goals

Educate students to a comprehensive approach to optimize the environmental footprint of a building project. Lay the foundation of general knowledge of green building and sustainable architecture, as well as knowledge of green materials and innovative. Acquire control of the implementation of of the various building systems and the overall energy balance of a building.Prepare students for the diversity of sources of employment following the specialty or quality of the actors in a folder eco-construction.

Bibliography

Dominique Gauzin-Muller "la construction écologique" ed le Moniteur, Paris 2000,

Bâtir en terre - Du grain de sable à l'architecture, de Lætitia Fontaine et Romain Anger. Editions Belin/Cité des Sciences et de l'Industrie, 2009. 223 pages, 30 euros

Caractéristique des produits pour la construction durable, Éditions Le Moniteur, Paris, 2008. ISBN 978-2-281-11411-9

Jean Hetzel, Indicateurs du développement durable dans la construction, Afnor Editions, 2009. ISBN 978-2-12-465191-7

La gouvernance du développement durable sous la direction de Pierre JACQUET, Rajendra K. PACHAURI et Laurence TUBIANA ; Paris : Presses de Sciences PO, 2009. ISBN 978-2-7246-1091-8

Bâtir éthique et responsable ouvrage collectif de : J. Benoit, S. Déoux, C. Desmoulins, A. Farel, D. Fauré, E. Fradin, D. Gauzin-Müller, T. Jusselme, P. Madec, J. Testart ; Collection : Questions d'architecture, Editions Le Moniteur, Paris, 2007. ISBN 978-2-281-19332-9

Françoise Jadoul, Vers un nouvel habitat, Aparté éditions, 2010. ISBN 978-2-930327-25-9

Prerequisites

None

Learning outcomes

Learning outcomes	N	A	M	E	O
• Energy balance	✓	·	·	·	·
• General knowledge of green building	·	✓	·	·	·
• Knowledge of green materials and innovative	·	✓	·	·	·

Manager : Jérôme CLAVERIE

Eco-conception

Hours

Lect	Tut	PW	Proj	WP	Asst
12.5	6.5		24		5

Evaluation

2 evaluations :

- *Devoir surveillé*
- *Rapport*

Bibliography

COURGEY Samuel & OLIVA Jean-Pierre, La conception bioclimatique, 2006

COURGEY Samuel & OLIVA Jean-Pierre, L'isolation thermique écologique, éd. revue 2010

LAVIGNE Pierre & FERNANDEZ Pierre, Concevoir des bâtiments bioclimatiques, Editions du Moniteur, 2009

LIEBARD Alain & DE HERDE André, Traité d'architecture et d'urbanisme bioclimatiques, Editions Moniteur, 2005

Prerequisites

Ecoconstruction 1 and 2.

Learning outcomes

Learning outcomes	N	A	M	E	O
•	·	·	✓	·	·
•	·	✓	·	·	·
•	✓	·	·	·	·
•	·	·	✓	·	·

Manager : Anne-Sophie ENEE

Eco-construction : Life Cycle Analysis

Hours

Lect	Tut	PW	Proj	WP	Asst
15	1.5	12			15

Evaluation

3 evaluations :

- *Contrôle continu*
- *DS*
- *TP*

Outline

Introduction to Life Cycle Assessment
Objectives, system and functional unit
Life Cycle Inventory
Impact assessment
Interpretation
The EN15804 standard: a declination of LCA to buildings

Goals

This course aims to educate students to the Life Cycle Assessment method, its use and its specificities when applied to civil engineering and construction.

Bibliography

normes: ISO 14040 and EN15804
Jolliet et al. Analyse de Cycle de Vie, Comprendre et réaliser un écobilan

Prerequisites

none

Learning outcomes

Learning outcomes	N	A	M	E	O
• Understand a LCA study	·	·	✓	·	·
• Perform a LCA study applied to construction	·	·	✓	·	·
• Understand the limits of a LCA study	·	·	✓	·	·
• Analyse and interprate a LCA study	·	·	✓	·	·
• Understand environmental stakes of the construction sector	✓	·	·	·	·
• Understand the standard EN15804	·	·	✓	·	·

Manager : Jérôme CLAVERIE

Electricity and protection in buildings

Hours

Lect	Tut	PW	Proj	WP	Asst
1.25	10.75				8

Evaluation

One evaluation : *Devoir surveillé*

Outline

1) single-phase circuits: impedance, active, reactive and apparent power
2) three phase circuits: utility, couplings star and delta, three-phase power.
3) Analysis and control of electrical risk:
-awareness of electrical risk, protective equipment (fuses, circuit breakers, DDR).
-Low voltage installations: NF C15-100,
- Sizing protection circuits sketch plan of the switchboard in the case of housing.

Goals

The aim is to sensitize students to the problems of protection and security for individual, collective and industrial electrical Installation. Are discussed the concepts of single phase and three phase circuits, and protection of persons and electrical Installation (high current, low, neutral systems, etc.)

Learning outcomes

Learning outcomes	N	A	M	E	O
• Have the foundation necessary to calculate the electrical impedance, power, understand electrical schematics of low voltage in the building,	·	✓	·	·	·
• Know the problems of protection and security for electricity	·	✓	·	·	·
• Knowing NF C15-100 fixing the electrical elements in the home	·	✓	·	·	·

Manager : François BIGNONNET

Finishing work

Hours

Lect	Tut	PW	Proj	WP	Asst
7.5			16		12.5

Evaluation

One evaluation : *Rapport de projet*

Outline

1. Standards and certifications
   - Standards, DTU, Technical Aplication Document (TAD), CE marking...
   2. Building envelope
   - Waterproofing solutions, cladding, roof systems, windows and exterior doors.
   3.
   - Partitions, wall insulation, dropped ceiling, flooring, wall covering.

Goals

The aim is to give to engineer students basic kwnoledge about finishing works (excluding electricity, HVAC systems and plumbing)

Bibliography

Mémotech Enveloppe du bâtiment, J.M. DESTRAC, édition Casteilla
Guide Véritas des techniques de la construction, Éditions Le Moniteur
La technique du bâtiment existant, Bureau Veritas, Éditions Le Moniteur
Collection Guide pratique, CSTB

Prerequisites

Civil engineering materials and durability - semester 5

Learning outcomes

Learning outcomes	N	A	M	E	O
• Understand a finishing work specification.	·	·	✓	·	·
• Write a finishing work specification.	·	✓	·	·	·
• Propose technical solutions in accordance with the standards and certifications.	·	✓	·	·	·

Manager : Valérie HOORELBECK

Fluids Mechanics

Hours

Lect	Tut	PW	Proj	WP	Asst
15	16.5	8			20

Evaluation

3 evaluations :

- *Contrôle continu*
- *Devoir surveillé*
- *Compte-rendu de TP*

Outline

1. Introduction to fluid mechanics
2. Fluid statics
3. Fluid kinematics
4. Fuid dynamics
5. Ideal fluid
6. Viscous fluid
7. Hydraulic pumps
8. Dimensional analysis and similitude

Goals

Presentation of the fundamentals of fluid mechanics leading to the design of a fluidic system.

Bibliography

? R. COMOLET, « Mécanique des fluides expérimentale », tomes 1 et 2
? R. OUZIAUX, J.PERRIER, « Mécanique des fluides appliquée, Cours et exercices »

Prerequisites

None

Learning outcomes

Learning outcomes	N	A	M	E	O
• Calculation of hydrostatic forces	·	·	✓	·	·
• Calculation of head loss in a pipe.	·	·	✓	·	·
• Choice of a pump for an installation.	·	✓	·	·	·

Manager : Annaig COTONNEC

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*

Geotechnical engineering

Hours

Lect	Tut	PW	Proj	WP	Asst
17.5	20.25	8			25

Evaluation

4 evaluations :

- *Devoir surveillé*
- *CR de TP Plaxis*
- *CR de TP Schneebeli*
- *CR TP Terrain*

Outline

1. Limit balance, earth pressure.
   2. Retaining walls:
   3. In situ tests:
   4. Shallow foundations:
   5. Metal sheet piles:
   6. Stability of slopes

   TP 1: of modeling with Plaxis (Simulation of a problem of consolidation and interaction soil-structure)
   TP 2: physical modeling of geotechnical structure with a schneebelli device.

Goals

To use the theoretical notions of the Soil mechanics for the design of the stuctures in Geotechnics:
- In situ Tests; - Shallow foundations; - Retaining Walls; - Metal Sheet piles; - Stability of the slopes

Bibliography

NF EN 1997-1 Juin 2005 Eurocode 7 : calcul géotechnique
Fondations et ouvrages en terre, G Pjilipponnat et Bertrand Hubert, Eyrolles 1998.
Géotechnique appliquée au BTP, P Martin, Eyrolles, 2010.
Plaxis manuel

Prerequisites

? Soil Mechanics
? Structural safety and calculation
? Finite element method

Learning outcomes

Learning outcomes	N	A	M	E	O
• To know the method of characterization in-situ of the soil	✓	·	·	·	·
• Design of the geotechnical structures	·	✓	·	·	·
• Design of slope and its checking satbility	·	✓	·	·	·
• Numerical simulation of geotechnical structures	·	·	✓	·	·

Manager : Nabil ISSAADI

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*

Highway Engineering

Hours

Lect	Tut	PW	Proj	WP	Asst
8.75	9				8

Evaluation

2 evaluations :

- *DS VRD*
- *DS Hydrologie*

Outline

1. Road design
   2. Generalities on networks, civil engineering and urban planning
   3. Dry networks (electricity, public lighting, telecommunications)
   4. Coordination and standards

Goals

The study of urban roads et networks are presented in that course.

After an introduction on the role of networks in urban planning, three aspects of the networks are discussed : design, construction and maintenance. The focus will be especially on dry networks (electricity, public lighting, telecommunications...).

Bibliography

Articles du Moniteur des travaux publics et de la Gazette des Communes
Guide pratique des VRD et aménagements extérieurs, G. Karsenty
Pratique des VRD et aménagement urbain : voirie et réseaux durables, R.Bourrier et B.Selmi,
VRD, voirie réseaux divers, terrassements, espaces verts : aide-mémoire du concepteur, R.Bayon
Code pratique de la voirie et des réseaux divers, M-O.Avril
"la ville et son assainissement" source : CERTU, année : 2003

Learning outcomes

Learning outcomes	N	A	M	E	O
• Design, coordinate and maintain urban networks	·	·	✓	·	·
• Estimate the costs of production and the management methods	·	✓	·	·	·

Manager : Nabil ISSAADI

History, business knowledge and entrepreneurship

Hours

Lect	Tut	PW	Proj	WP	Asst
15	15				4

Evaluation

One evaluation : *Contrôle continu*

Bibliography

? Cyr, A. (2009). Les représentations entrepreneuriales, sous la direction de Louis Jacques Filion et Christian Bourion, Paris, Eska, 2008, 262 p. Revue internationale PME Économie et gestion de la petite et moyenne entreprise, 22(3-4), 174-176.

? Henri Mintzberg, Structure et dynamique des organisations (Éd. d'organisation)

? http://www.laurentdehouck.fr/enseignements/histoire-des-idees-sur-les-organisations/

? M. Bidan et Y. Livian (2022), les grands auteurs aux frontières du management (Editions EMS)

? M.Crozier ; A quoi sert la sociologie des organisations (Éd. Seli Arslan)

? Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005). Clarifying business models: Origins, present, and future of the concept. Communications of the association for Information Systems, 16(1), 1.

? Ramadani, V. (2009). Business angels: who they really are. Strategic Change: Briefings in Entrepreneurial Finance, 18(7?8), 249-258.

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? Sarasvathy, S. D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. Academy of management Review, 26(2), 243-263.

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-6	✓	·	·	·	·

Manager : Luc OILI

Intelligent management of energy, water and waste

Hours

Lect	Tut	PW	Proj	WP	Asst
18.5	12				12

Evaluation

2 evaluations :

- *Compte rendu*
- *devoir surveillé*

Learning outcomes

Learning outcomes	N	A	M	E	O
• XX	·	✓	·	·	·
• XX	✓	·	·	·	·
• xx	✓	·	·	·	·
• XX	✓	·	·	·	·

Manager : Stéphane LAIGLE

Intercultural explorations

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Maintenance of buildings

Hours

Lect	Tut	PW	Proj	WP	Asst
24.5	7.5				10

Evaluation

3 evaluations :

- *Rapport diagnostic*
- *Devoir surveillé*
- *Etude de cas*

Outline

1. Management of the heritage
   2 Evolution and issue of rehabilitation
   3 Issues for a contracting authority
   4. Study and design of a restoration of a former frame
   5 Diagnosis
   6 Case study of pardons
   7. Technical visit

Goals

This module allows to initiate a comprehensive maintenance and rehabilitation. It opens up perspectives towards new professional goals.

Bibliography

-« Les désordres dans le bâtiment » ; COLLECTION Moniteur référence technique
-« Entretien et maintenance des immeubles » ; Afnor
-« Guide Socotec de la maintenance et de la réhabilitation » ; Edition Moniteur
-« Maintenance des bâtiments en 250 ?ches pratiques » ; Edition Moniteur)
-« Réhabilitation des bâtiments de Pascale Joffroy » ; Edition Moniteur

Prerequisites

-Introduction to architecture
-Materials engineering and -Project management, organization, planni?cation
-Security and stability of constructions

Learning outcomes

Learning outcomes	N	A	M	E	O
• Awareness of the role and the obligations of those responsible for management of heritage	✓	·	·	·	·
• Understand the operation of rehabilitation approach	✓	·	·	·	·
• Understand the role and obligations of a contracting authority	✓	·	·	·	·
• Understand the role and obligations of a contractor for restoration	✓	·	·	·	·
• Know the steps of diagnosis before work	✓	·	·	·	·
• Main techniques of restructuring	✓	·	·	·	·

Manager : Didier HENNETIER

Mechanics of Structures 1

Hours

Lect	Tut	PW	Proj	WP	Asst
10	34.25	12			25

Evaluation

3 evaluations :

- *Devoir surveillé 1*
- *Devoir surveillé 2*
- *Contrôle Continu*

Outline

1 - Modeling of a structure / Actions on structures / degree of mates
2 - Static
3 - Geometric characteristics of the sections)
4 - Basic relations of the RDM / diagrams of stresses
5 - Stresses and strains at a point
6 - Characteristics of the materials / Relations stresses - deformation
7 - Energy theorems
8 - State of stresses and deformations of a beam under moment bending
9 - Method of the forces applied to the portal
10 - Study of continuous beams

Goals

Introduction of tools of the resistance of materials in a pragmatic approach geared towards the needs of the Office engineer. Many applications use support for implementation, taking into consideration the characteristics of the materials of the civil engineering, deformability and breaking.

Bibliography

? C. WIELGOSZ; « Résistance des matériaux, élasticité, plasticité, éléments finis » ; Ellipses - Daniel Gay, Jacques Gambelin ; « Dimensionnement des structures, une introduction » ; Hermès sciences, 1999, ISBN 2-7462-0049-X

? José Ouin ; « Mécanique des structures, rappels de cours et applications » ; Casteilla, 1997, ISBN 2-7135-1753-2

? Pierre Agapi, Frédéric Lerouge, Marc Rosseto ; « Résistance des matériaux » ; DUNOD, 1999, ISBN 2-10-048777-9

Prerequisites

Level licence 2 scientific

Learning outcomes

Learning outcomes	N	A	M	E	O
• Determine the stresses in a structure isostatic or hyperstatic typical of civil engineering (portico, beam)	·	·	✓	·	·
• Determine the distribution of stresses in a straight section	·	·	✓	·	·
• Calculate the deformations and displacements in the studied structures	·	·	✓	·	·

Mechanics of Structures 2

Hours

Lect	Tut	PW	Proj	WP	Asst
3.75	12.75				6

Evaluation

2 evaluations :

- *Devoir surveillé*
- *TP*

Outline

1. Distribution of shear stress
   2 Loads composed
   3 Torsion, buckling and spill

Goals

Introduction of tools of the resistance of materials in a pragmatic approach geared towards the needs of the Office engineer. Many applications use support for implementation, taking into consideration the characteristics of the materials of the civil engineering, deformability and breaking.

Bibliography

? C. WIELGOSZ; « Résistance des matériaux, élasticité, plasticité, éléments finis » ; Ellipses - Daniel Gay, Jacques Gambelin ; « Dimensionnement des structures, une introduction » ; Hermès sciences, 1999, ISBN 2-7462-0049-X

? José Ouin ; « Mécanique des structures, rappels de cours et applications » ; Casteilla, 1997, ISBN 2-7135-1753-2

? Pierre Agapi, Frédéric Lerouge, Marc Rosseto ; « Résistance des matériaux » ; DUNOD, 1999, ISBN 2-10-048777-9

Prerequisites

The module row 1 of the semester 5

Learning outcomes

Learning outcomes	N	A	M	E	O
• Connaitre la répartition des contraintes de cisaillement dans une section droite	·	·	✓	·	·
• Calculer la répartition des contraintes normales dans une section soumise à des sollicitations composées	·	·	✓	·	·
• Connaître les phénomènes d'instabilités	✓	·	·	·	·

Manager : Philippe VAGNER

Negotiations

Hours

Lect	Tut	PW	Proj	WP	Asst
3	7.5				2

Evaluation

One evaluation : *Vidéo*

Bibliography

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

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-4	✓	·	·	·	·

Manager : John KINGSTON

Non linear mechanics

Hours

Lect	Tut	PW	Proj	WP	Asst
10	14				12

Evaluation

2 evaluations :

- *Contrôle continu*
- *Devoir surveillé*

Outline

1. Fundamental requirements.
   - Strain analysis.
   - Rheological models.
   2. Plasticity of bars.
   - Tension testing experience.
   - Behaviour modelling of the tension-compression testing experience.
   - Comprehensive solution of an elastic-plastic problem.
   3. Plasticity of beams.
   - Preliminaries.
   - Elastic-Plastic model.
   - Structure modelling featuring plastic hinges.
   4. Three-dimensional plasticity.
   - Yield criteria in 3D plasticity.
   - Flow rule.
   - Numerical modelling.

Goals

Analysis of the behaviour of structures through an appropriate elastoplastic modelling approach. Complex structural analysis in three dimensional space using an appropriate FEM based software. Introduction to limit analysis.

Bibliography

- CHABOCHE, LEMAITRE; « Mécanique des matériaux solides »; Dunod, 1985
- HALEPHEN, SALENÇON; « Élastoplasticité »; Presses de l'Ecole Nationale des Ponts et Chaussées, 1987
- OWEN, HINTON; « Finite Elements in Plasticity: Theory and Practice »; Pineridge Press, 1980

Learning outcomes

Learning outcomes	N	A	M	E	O
• Elastic-plastic model, rheology and mathematical equations	·	✓	·	·	·
• Worked examples: academic test cases	·	·	✓	·	·
• Structural modelling	·	✓	·	·	·
• Understanding of an elastic perfectly plastic analysis	·	·	✓	·	·
• Plasticity with hardening,	✓	·	·	·	·

Manager : Charbel EL SOUEIDY

Numerical methods

Hours

Lect	Tut	PW	Proj	WP	Asst
15	15.25		8		15

Evaluation

2 evaluations :

- *Devoir surveillé*
- *CC et Projet*

Outline

1. Mathematical modeling: discretization, boundary conditions, problem formulation, stiffness matrix, assembly

2. Finite elements: bars, beams, static (1D) and 2D extension problems (elasticity)

3. Application of FEM in structural dynamics

4. Application of FEM to study the flow (stationary and turbulent) and heat transfer by conduction mainly

Goals

? Apply the finite element method (FEM) for mechanical structures from simple elements (bars and beams).

? Implement the FEM on software to treat behavior problems in civil engineering structures (static and dynamic).

? Establish links and comparisons between FEM and analytical methods

? Implement the FEM on a projects (building, bridges ...).

? Show the possibilities of applying of FEM to study flows and heat transfer.

Bibliography

C. WIELGOSZ; « Résistance des matériaux, élasticité, plasticité, éléments finis » ; Editions Ellipses, 1999.

J.C CUILLIERE; « Introduction à la méthode des éléments finis Cours et exercices corrigés », Editions Dunod, 2011.

J.L Batoz, G. Dhatt ; « Modélisation des structures par éléments finis», Presse de l'université de Laval, 1990

G. Dhatt, G. Touzot ; « Une présentation de la méthode des éléments finis », Presse de l'université de Laval, 1981.

T. Gmür ; « Méthodes des éléments finis en mécanique des structures », Presses Polytechniques et universitaires romandes, 2007.

S. Gounand ; « Introduction à la méthode des éléments ?nis en mécanique des ?uides incompressibles », Polycopié du CEA, Septembre 2012.

P.A Raviart ; « Les méthodes d'éléments finis en mécanique des fluides », Editions Eyrolles, 1981.

A. Filiatrault ; « Eléments de génie parasismique et de calcul dynamique des structures » Editions de l' Ecole Polytechnique de Montréal, 1996.

Prerequisites

Basic notions of Strength of Materials and integral calculation

Learning outcomes

Learning outcomes	N	A	M	E	O
• Physical modelling	·	✓	·	·	·
• Analysis of the results in terms of design	·	·	✓	·	·
• Using a computer code	✓	·	·	·	·

Manager : Ouali AMIRI

People and team management

Hours

Lect	Tut	PW	Proj	WP	Asst
	10.5				6

Evaluation

One evaluation : *DS*

Bibliography

- Le chaos Management / Tom Peters / Intereditions
- Manager dans la complexité / Dominique Genelot / Insep Editions
- Les responsables porteurs de sens / Vincent Lenhardt / Insep Editions
- De la performance à l'excellence / Jim Collins / Village Mondial
- Comment leur dire / Gérard Collignon / Intereditions
- Communiquer, motiver, manager en personne/ Taibi Kahler / Intereditions
- Vidéos d'Edgar Morin sur la complexité / Youtube
- Management et communication : 100 exercices / Denis Cristol / ESF editeur

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	✓	·	·	·	·
• TPN4	✓	·	·	·	·
• TPN-6	✓	·	·	·	·

Manager : Anouk GREVIN

Physical education and sport 1

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-7	✓	·	·	·	·
• TPN-12	✓	·	·	·	·
• TPN-19	✓	·	·	·	·

Manager : Jérôme BEZIER

Physical education and sport 2

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-7	✓	·	·	·	·
• TPN-12	✓	·	·	·	·
• TPN-19	✓	·	·	·	·

Manager : Jérôme BEZIER

Physical education and sport 3

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	·	✓	·	·	·

Manager : Jérôme BEZIER

Physical education and sport 4

Hours

Lect	Tut	PW	Proj	WP	Asst
	21				2

Evaluation

One evaluation : *Contrôle continu*

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	·	✓	·	·	·

Manager : Jérôme BEZIER

Prevention of risks

Hours

Lect	Tut	PW	Proj	WP	Asst
3.75	9				5

Evaluation

2 evaluations :

- *DS Prévention*
- *DS Sécurité Incendie*

Outline

1. Raising awareness to the prevention on the construction sites of buildings
2. Roles of the actors of the prevention
3. The best practice of the prevention on the construction sites of buildings
4. Case studies
5. Notions of fire safety
6. Classifications of buildings
7. Regulations for buildings receiving of public
8. Regulations for residential buildings

Goals

This teaching allows to discover the regulations concerning the fire safety. It prepares the training course of the end of first year by introducing the students to the principles of risk prevention on construction sites and present the actors of the prevention and their missions

Bibliography

- http://www.oppbtp.com/
- http://www.preventionbtp.fr/
- http://www.inrs.fr/
- NF ISO 16732-1 Avril 2012 Ingénierie de la sécurité incendie - Évaluation du risque d'incendie

Prerequisites

Know the methods of construction of a building

Learning outcomes

Learning outcomes	N	A	M	E	O
• Know the main principles and rules of fire safety regulations	·	✓	·	·	·
• Being aware of the prevention, knowing the general principles about the existence and role of the main actors, their responsibilities and penalties.	✓	·	·	·	·
• Knowing how to analyze in situ situation and propose solutions to prevent	·	✓	·	·	·

Manager : Stéphane LAIGLE

Professional English 3

Hours

Lect	Tut	PW	Proj	WP	Asst
	19	2			

Evaluation

3 evaluations :

- *CC*
- *Tutorat*
- *DS*

Professional Project 3

Hours

Lect	Tut	PW	Proj	WP	Asst
	12				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 professionnal 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)

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	✓	·	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-5	✓	·	·	·	·
• TPN-6	✓	·	·	·	·
• TPN-7	✓	·	·	·	·

Manager : Sylvaine GAUTIER

Professional project 4

Hours

Lect	Tut	PW	Proj	WP	Asst
	12				2

Evaluation

One evaluation : *Pas d'évaluation*

Bibliography

Ressources : Évolueront selon les thématiques choisies par les intervenants - en lien avec les TPN et les objectifs de ce module.

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	✓	·	·	·	·
• TPN-3	✓	·	·	·	·
• TPN-5	✓	·	·	·	·
• TPN-6	✓	·	·	·	·
• TPN-7	✓	·	·	·	·

Manager : Sylvaine GAUTIER

Professionnal project 1

Hours

Lect	Tut	PW	Proj	WP	Asst
1.5	16.5				4.5

Evaluation

One evaluation : *Contrôle continu*

Bibliography

- DE LASSUS René, L'analyse transactionnelle : une méthode révolutionnaire pour bien se connaître et mieux communiquer, Marabout (Savoir pratique n3516), 2013, 288 p., ISBN 2501085493

- DE LASSUS René, La communication efficace par la PNL, Marabout (Bien-être - Psy), 2019, 288 p., ISBN 2501089499

- DE LASSUS René, L'ennéagramme : les 9 types de personnalités, Marabout (Poche Psy n3568), 2019, 288 p., ISBN 2501084950

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- LEONARD Thomas J., The portable coach, Simon & SCHUSTER, 1999, 336 p., ISBN-10 : 0684850419 / ISBN-13 : 9780684850412

- ROSENBERG Marshall B., Les mots sont des fenêtres (ou bien ce sont des murs) : initiation à la communication non-violente, La Découverte, 2016, 320 p., ISBN 2707188794

- www.16personalities.com

- www.acnv.com

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-2	·	✓	·	·	·
• TPN-6	·	✓	·	·	·

Manager : Sylvaine GAUTIER

Professionnal project 2

Hours

Lect	Tut	PW	Proj	WP	Asst
	6				6

Evaluation

One evaluation : *Profil linkedin+rdv*

Bibliography

Grant : Givers & Takers TED

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-2	·	·	✓	·	·
• TPN-6	·	✓	·	·	·
• TPN-7	·	✓	·	·	·

Manager : John KINGSTON

Project management 1

Hours

Lect	Tut	PW	Proj	WP	Asst
4.5		3			2

Evaluation

One evaluation : *Vidéo*

Bibliography

- HEAGNEY, Joseph. Fundamentals of project management. Amacom, 2016
- BOURGEOIS, Jean-Paul. Gestion de projet. Ed. Techniques Ingénieur, 1997
- MARSHALL B. ROSENBERG Communication Non-Violente et Pouvoir - Les clés d'un langage instaurant adhésion et confiance, ISBN-13 : 978-2729620851.

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-2	·	✓	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	✓	·	·	·	·
• TPN-7	✓	·	·	·	·

Manager : John KINGSTON

Project management 2

Hours

Lect	Tut	PW	Proj	WP	Asst
	15				3

Evaluation

One evaluation : *Contrôle continu*

Bibliography

Partie analyse du travail : PIERRE VERMERSCH, 1994 « L'entretien d'explicitation », ESF éditeur

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	·	✓	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	·	✓	·	·	·

Manager : John KINGSTON

Project on HVAC systems

Hours

Lect	Tut	PW	Proj	WP	Asst
			16		10

Evaluation

One evaluation : *Rapport de projet*

Outline

1. Heat loss calculation
   2. Design of the heat production system
   3. Choice of radiators and distribution type
   4. Design of the ventilation system

   Depending on the project: optimization, air conditioning ...

Goals

Design of the HVAC systems of a building : heating, ventilation and air conditioning

Bibliography

- J. Bouteloup; « Climatisation et conditionnement d'air »; Editions parisiennes, 2001
- Dal Zotto, Larre, Merlet, Picau ; « Memotech : génie énergétique » ; Casteilla, 2011

Prerequisites

HVAC systems 1

HVAC systems 2

Learning outcomes

Learning outcomes	N	A	M	E	O
• Calcul of the heat loss of a building	·	·	✓	·	·
• Pre-design of HVAC systems	·	✓	·	·	·
• Propose an energetic optimization	✓	·	·	·	·

Manager : Anne-Sophie ENEE

Quality, security and environmental approaches (QSE1)

Hours

Lect	Tut	PW	Proj	WP	Asst
	4.5	3			

Evaluation

One evaluation : *QCM+exercices*

Bibliography

Ressources documentaires disponibles sur madoc :

o Le Code du travail numérique

o Code de l'environnement LEGIFRANCE

o Les aventures de Napo vidéos d'animation INRS pour sensibilisation à la sécurité au travail

o Publications et outils de l'INRS Institut national de recherche et de sécurité

o AIDA : Site web des textes réglementaires du Ministère en charge de l'environnement

o Les fiches sur le fonctionnement des principales institutions de la République, l'organisation de l'Union européenne et les relations internationales

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-3	·	✓	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	✓	·	·	·	·

Manager : John KINGSTON

Quality, security ant environmental approaches (QSE2)

Hours

Lect	Tut	PW	Proj	WP	Asst
	7.5				

Evaluation

One evaluation : *QCM+exercices*

Bibliography

Références ou ressources documentaires disponibles sur madoc :

- Les fiches sur le fonctionnement des principales institutions de la République, l'organisation de l'Union européenne et les relations internationales
- Publications et outils de l'INRS Institut national de recherche et de sécurité
- Rapports détaillés des accidents industriels sur la base de donnée ARIA
- Outils MARP de Techniques de l'Ingénieur.

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-3	·	✓	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-5	✓	·	·	·	·

Manager : John KINGSTON

Reinforced and pre-stressed concrete

Hours

Lect	Tut	PW	Proj	WP	Asst
16.25	17.75		16		30

Evaluation

3 evaluations :

- *Contrôle continu*
- *Devoir surveillé*
- *Rapport de projet*

Outline

1. Further knowledge of reinforced conret :
   ? Design of slabs for flexure
   ? Design of staircases
   2. Prestation the Creep, Shrinkage Concrete and Relaxation of Steel
   3. pre-stressed concrete
   ? Presentation
   ? Introduction, Prestressing Systems and Material Properties
   ? Losses in Prestress
   ? Design of Members

Goals

This course present 2 parts : complement of reinforced conret andthe principles of pre-stressed concrete.

Bibliography

- Eurocodes 2

- P. Le Delliou; « Béton précontraint aux eurocodes »; Presses universitaires de Lyon (PUL), 15/12/2003, ISBN : 2-7297-0724-7

- R. Chaussin, A. Fuentes, R. Lacroix, J. Perchat; « La précontrainte »; Presses de l'école nationale des Ponts et Chaussées (ENPC), 01/12/1992

Prerequisites

? Mechanics of Structures
   ? Structural safety and calculation
   ? Reinforced concrete 1

Learning outcomes

Learning outcomes	N	A	M	E	O
• To know the principles of pre-stressed concrete	·	·	✓	·	·
• Design of pre-stressed beams	·	✓	·	·	·
• Design of slabs	·	✓	·	·	·
• To concieve a reinforcement in the areas of discontinuity	✓	·	·	·	·

Manager : Fateh BENDAHMANE

Reinforced concrete

Hours

Lect	Tut	PW	Proj	WP	Asst
18.75	21.5	16	18		20

Evaluation

3 evaluations :

- *TP*
- *Devoir Surveillé*
- *Projet*

Outline

? Concrete properties
? Behaviour in flexure (analysis at Service Loads and Ultimate Limit State) and Design of beams for flexure
? Basic design concepts
? Design for shear
? Design of continuous beams
? Design of columns under uniaxial compression
? Design of footings foundation and retaining walls

Goals

This course present the reinforced concrete and its applications. It also explains the role of structural design in a reinforced concrete construction, and outlines the various structural systems that are commonly adopted in buildings

Bibliography

Les Eurocodes (NF EN 1992-1-1, NF EN 1992-1-1/NA),
Le Projet de béton armé, SEBTP, 6ème étudion, Henrry Thonier,2011,
Aide mémoire ; béton armé, Le Moniteur; Dunod 2ème édition, Pierre Guillemont, 2006.

Prerequisites

? Mechanics of Structures
? Structural safety and calculation

Learning outcomes

Learning outcomes	N	A	M	E	O
• Design of various structural systems adopted in buildings	·	✓	·	·	·
• To know the design procedure	·	·	✓	·	·
• Product plans structure	·	✓	·	·	·

Manager : Fateh BENDAHMANE

Scientific et technical research

Hours

Lect	Tut	PW	Proj	WP	Asst
10	2		12		12

Evaluation

2 evaluations :

- *Rapport*
- *Soutenance*

Outline

1. Definition of scientific purposes
2. Choice of innovative methodology
3. Research of articles and documents

Goals

The objective of this teaching unit is to develop and widen research and innovation skills of civil engineering students including research project management. Other goals are to develop their interest in innovation and allowing them to discover links between engineering and research.

Prerequisites

Initiation to research

Learning outcomes

Learning outcomes	N	A	M	E	O
• Identification of civil engineering research and development topics	·	·	✓	·	·
• Research of articles or documents and choice of innovative methodology	·	·	✓	·	·

Manager : Ouali AMIRI

Second foreign language - Chinese

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Second foreign language - Chinese

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Second foreign language - German

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Second foreign language - German

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Second foreign language - Japanese

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Second foreign language - Japanese

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*

Second foreign language - Spanish

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				

Evaluation

One evaluation : *CC*

Socio-economic debates

Hours

Lect	Tut	PW	Proj	WP	Asst
	18				10

Evaluation

One evaluation : *Exposé débat*

Bibliography

De nombreuses références seront proposées dans chacun des 6 thèmes (liens vidéos, articles et livres) ; quelques livres de base peuvent cependant servir à tous les thèmes :

- BRAQUET Laurent et MOUREY David, Comprendre les fondamentaux de l'économie, De Boeck, 2015, 475 p., ISBN 978-2-8041-9021-7
- BIASUTTI Jean-Pierre et BRAQUET Laurent, Les débats économiques d'aujourd'hui, Ellipses, 2019, 278p, ISBN 9782340-031210
- DESCAMPS Christian, L'analyse économique en questions, Vuibert, 2005, ISBN 2-71117-7413-9
- SINAÏ Agnès, Penser la décroissance, Sciences Po Les presses, 2018, 210 p, ISBN 9782724613001
- SINAÏ Agnès, Economie de l'après-croissance, Sciences Po Les presses, 2018, ISBN 9782724617559
- PIKETTY Thomas, Capital et idéologie, Seuil, 2019, ISBN 978-2-02-133804-1
- COHEN Daniel, Le monde est clos et le désir infini, Albin Michel, 2015, ISBN 978-2226240293

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-3	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-1	·	✓	·	·	·
• TPN-2	·	✓	·	·	·
• TPN-3	·	✓	·	·	·
• TPN-8	✓	·	·	·	·
• TPN-9	✓	·	·	·	·
• TPN-10	·	✓	·	·	·
• TPN-11	✓	·	·	·	·

Manager : Chrystèle GONCALVES

Soft skills

Hours

Lect	Tut	PW	Proj	WP	Asst
	7.5				

Evaluation

One evaluation : *Examen:cas pratique*

Bibliography

- La confiance en gestion : un regard pluridisciplinaire (Boissieu & Oguchi, 2011)
- Trust Rules: How the World's Best Managers Create Great Places to Work (Lee, 2017)
- Give and Take: A Revolutionary Approach to Success (Grant, 2013)
- L'entreprise une affaire de don (Collectif, 2016)
- La théorie des jeux - Science étonnante
- Jeu sur l'évolution de la confiance
- The Office (NBC, 2005)
- Mad Men (HBO, 2007)

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-1	✓	·	·	·	·
• TPN-2	✓	·	·	·	·
• TPN-4	✓	·	·	·	·
• TPN-6	✓	·	·	·	·
• TPN-5	✓	·	·	·	·
• TPN-6	✓	·	·	·	·
• TPN-7	✓	·	·	·	·
• TPN-12	✓	·	·	·	·
• TPN-13	✓	·	·	·	·
• TPN-20	✓	·	·	·	·
• TPN-21	✓	·	·	·	·

Manager : Roland BESSENAY

Soil mechanics

Hours

Lect	Tut	PW	Proj	WP	Asst
13.75	17.75	16			23

Evaluation

3 evaluations :

- *DS1*
- *TP*
- *DS2*

Outline

1. Basic physical properties of soils - Soil description and classification: Soil composition - Phase relationships - Coarse grained soil and fine grained soil - Soil identification (Grain size distribution, consistency of cohesive soils) - Soil classification - Compaction of soils, Proctor test, CBR test. 2. Flow of water in soil - permeability and seepage: Hydraulic head, Darcy's law and permeability - Determination of the coefficient of permeability in the laboratory and permeability of stratified soils - Seepage theory and flow net -Effective stresses - Seepage force per unit volume, critical hydraulic gradient of piping and heaving - Capillary rise in soils. 3. Consolidation theory - settlement: Stresses and displacements in a soil mass from elastic theory - Soil compressibility - Oedometer test - Void ratio-pressure plot - Preconsolidation pressure - Settlement - Terzagh'i theory of one-dimensional consolidation - Determination of coefficient of consolidation. 4. Shear strength of soil: Friction angle and cohesion - Drained and undrained conditions - Shear box test - Triaxial shear test - Shear strength of coarse grained and fine grained soils - Consolidated Drained triaxial test - Unconsolidated Undrained triaxial test - Consolidated Undrained triaxial test.

Goals

This course presents the basic concepts of soil mechanics for use in the design of geotechnical structures.

Bibliography

1. COSTET, SANGLERAT , 1985, "Cours de Mécanique des Sols", Ed. Dunod 2. HOLTZ, KOVACS, "Introduction à la géotechnique", Editions de l'école polytechnique de Montréal.

3. SCHLOSSER, 1988, "Eléments de mécanique des sols", Presses de l'ENPC

4. CRAIG, 1986, "Soil mechanics", Ed. Van Nostrand Reinhold 5. DAS, 1985, "Principles of geotechnical engineering", third edition, PWS Publishing company, Boston

6. DAS. 1983, "Advanced soil mechanics" Mac Graw Hill international editions

Prerequisites

Continuum mechanics

Learning outcomes

Learning outcomes	N	A	M	E	O
• Soil characterization	·	·	✓	·	·
• Solution of seepage flow and consolidation problems	·	·	✓	·	·
• Characterization of soil shear strength	·	·	✓	·	·

Manager : Didier MAROT

Statistics and Probability

Hours

Lect	Tut	PW	Proj	WP	Asst
17.5	14				12

Evaluation

2 evaluations :

- *Contrôle continu*
- *Devoir surveillé*

Outline

1- Introduction to the purposes of the statistics in the data collection, analysis and interpretation
2- Univariate and bivariate statistical distributions (definition, graphical diagrams, numerical features)
3- Correlation and regression analysis (statistical dependence, least-squares approach, curve fit models)
4- Basic probability theory (random variables, expected value, standard deviation, variance
5- Probability-based calculations
6- Discrete and continuous probability distributions and use of the standard statistical tables
7- Statistical estimation and testing (confidence intervals, hypothesis testing, sampling reliability)

Goals

The objective is to deal with the theory of probability and statistics as a deductive discipline. Connections between content and applications will be systematically emphasized in order to enhance the students' learning and to aid in the solution of practical problems regarding data analysis and decision-making.

Bibliography

DELMAS B., Statistique descriptive, Nathan Université, 2ème édition, Paris 2000.
DROESBECKE J.J, Eléments de statistiques, 3e édition, Ellipse, 1997.
MASSONI A., Initiation aux Statistiques descriptives avec Excel, Vuibert, Septembre 2002.
VENTSEL H., Théorie des Probabilités, 1ère édition - MIR Moscou, 1973.
VEYSSEYRE R., Statistique et probabilités pour l'ingénieur, L'Usine Nouvelle, Dunod, Paris 2001.

Prerequisites

Applied mathematics

Learning outcomes

Learning outcomes	N	A	M	E	O
• Know how to describe, analyse and interpret a collection of data from the descriptive statistics tools.	·	·	✓	·	·
• Know how to write a non-deterministic issue from a given context in the language of probability.	·	·	✓	·	·
• Master the basic concepts of a probabilistic modelling : i.e. statistical parameters assessement and probability-based calculations, use of the most common probability distributions for simulation purposes.	·	·	✓	·	·
• Be able to identify a adjustment model and characterise its good matching.	·	✓	·	·	·
• Get a good understanding of hypothesis testing for application to decision-making process.	·	✓	·	·	·

Manager : Laurence MIEGEVILLE

Steel Structures

Hours

Lect	Tut	PW	Proj	WP	Asst
17.5	19		32		15

Evaluation

3 evaluations :

- *Contrôle continu*
- *Devoir surveillé*
- *Projet*

Outline

1. Plastic resistance and classification of sections
2. Resistance of sections
3. Resistance elements: form and verification of stability instabilities (buckling, and spills)
4. caclulation and verification of assemblies (bolt and welding)
5. Concepts of global analysis (semi-rigid, second order effects)

Goals

The aim of this cours is to presente the calculations and standard justifications of steel structures. After a physical approach of static balances, calculations are carried out in accordance with Eurocode 3 on common structural elements (columns, beams, purlins, trusses, bracing ...).

Bibliography

? collectif APK; « Construction métallique et mixte et acier, tomes 1 et 2 » ; Eyrolles, 2012.

? Jean MOREL; « Calcul des structures selon l'Eurocode 3 » ; Eyrolles, 1994, ISBN 2-212 11819-8

? Hirt, Manfred ; « CM : notions fondamentales et méthodes de dimensionnement » ; Presse polytechnique et universitaires romandes, 1994.

? Pierre BOURRIER, Yvon LESCOUARCH'H et Thierry FOULT, Constructions Civil et Industrielles » Presses de l'Ecole Nationale des Ponts et Chaussées, 1988.

? Pierre MAITRE, Formulaire de la construction métallique, Editions le Moniteur, 3eme Editions, 2009.

? Recueil des normes Francaises afnor, Bâtiment et Génie Civil construction métallique : Tome 1 Conception et calcul, 3eme Editions, 1990.

? Recueil des normes Francaises afnor, Bâtiment et Génie Civil construction métallique : Tome Matériaux, 3eme Editions, 1990.

? Manfred A.Hirt, Rolf Bez, Construction Métallique : Notions fondamentales et méthodes de dimensionnement, Trainté de l'Ecole Polytechnique Fédérale de Lausane, Volume 10, Presses Polytechniques et Universitaires Romandes, 1996.

? Jacques BROZETTI, Calcul des structures en acier Eurocode 3 : partie 1-1 : Régles générales et régles pour bâtiments, Editions Eyrolles, 1996.

Prerequisites

Strength of Materials; Structural Mechanics

Learning outcomes

Learning outcomes	N	A	M	E	O
• Connaitre les différents élements d'une structure métallique	·	·	✓	·	·
• Comprendre le comportement des constructions	·	·	✓	·	·
• Connaître les bases des règles de calcul	·	✓	·	·	·
• Produire un document d'exécution simple	·	·	✓	·	·

Manager : Ouali AMIRI

Steel-concrete construction

Hours

Lect	Tut	PW	Proj	WP	Asst
8.75	10.25		8		8

Evaluation

2 evaluations :

- *Devoir surveillé*
- *Rapport*

Outline

I - Bending of composite beams
II - Modeling of composite beams
III - Shear, longitudinal shear, shrinkage effects
IV - Connection between the slab and the metal frame
V - Composite columns compression
VI - Bridges framed mixed technology components

Goals

This module describes the principles of composite steel concrete construction and common applications in buildings and structures. A project work is proposed within the course to implement the studied principles.

Bibliography

* NF EN 1994-1-1 : Eurocode 4, Calcul des structures mixtes acier-béton, Partie 1-1 : . Référence C2561- Jean-Marie ARIBERT- 2004.

* Guide méthodologique Eurocodes 3 et 4 : application aux ponts-routes mixtes acier-béton, SETRA, ISBN : 978-2-11-094622-5.

* Construction métallique et mixte acier béton. Tome 1- J Brozzetti, P Bourrier. ISBN : 2-212-10152-X

Prerequisites

Structural mechanics, theory of beams.

Learning outcomes

Learning outcomes	N	A	M	E	O
• Knowing the principles of construction and conception of composite steel-concrete	·	·	✓	·	·
• calculate a simple structure	·	·	✓	·	·
• Establish a calculation with a professional software	·	✓	·	·	·

Manager : Nabil ISSAADI

Structural dynamics

Hours

Lect	Tut	PW	Proj	WP	Asst
11.25	14	8			16

Evaluation

2 evaluations :

- *Devoir surveillé*
- *TP*

Outline

Static, transient and dynamic calculations
Dynamic loading/dynamic response
Earthquakes/Seismicity/Earthquake hazard
Experimental tools in Earthquake Engineering
Spatial discretization
Discrete systems with 1 ddl
Discrete systems with n ddl
Methods for spatial and transient discretization
The finite element methods in dynamics
Generalized elementary systems
Norms and legislation for earthquake engineering structures

Goals

The objectives of this course is to apprehend earthquake risk, to learn how to do dynamic calculations and how to study the dynamic behavior of a building, to understand the basic principles of earthquake engineering design and how to use Eurocode 8

Bibliography

- Dynamique des structures - Application aux ouvrages de génie civil, Patrick Paultre, Hermès, Lavoisier, 2004,
- Génie parasismique. Volumes I-II-III, Betbeder-Matibet , J., Hermes sciences publ., Lavoisier, 2003,
- Dynamics of Structures, Theory and Applications to Earthquake Engineering, Anil K. Chopra, second edition, Prentice-Hall, 2001.

Prerequisites

Structural mechanics
Finite element method
Reinforced concrete

Learning outcomes

Learning outcomes	N	A	M	E	O
• Calculating a building submitted to an earthquake loading	·	✓	·	·	·
• Design of an earthquake resistant building	·	✓	·	·	·

Manager : François BIGNONNET

Structural safety and calculation

Hours

Lect	Tut	PW	Proj	WP	Asst
11.25	12.75				11

Evaluation

One evaluation : *Devoir surveillé*

Outline

? Safety and stability of constructions
- ? Safety Notions
- ? Load and Resistance Factor Design Format
- ? Probabilistic Analysis and Design
- ? The eurocodes
- ? Load Calculations
- ? Presentation the wind-bracing in de bulding
- ? Introduction to structural dynamics

Goals

This module introduces the structure modeling in an approach of respect of security and standards.

Bibliography

? Les Eurocodes (NF EN 1990, NF EN 1991)
- ? Les Eurocodes, conception des bâtiments et des ouvrages de génie civil (édition Le Moniteur 2005),
- ? Précis du bâtiment- D Didier, M Le Brazidec, P Nataf et J Thiesset (Nathan 2002).

Prerequisites

? Structure Mechanics

Learning outcomes

Learning outcomes	N	A	M	E	O
• To know the justification approach of the structural behavior of the civil engineer constructions .	·	·	✓	·	·
• To draw up a calculation note on a simple structure by taking of account Eurocodes standards	·	✓	·	·	·
• To formulate a problem with the limiting states.	·	·	✓	·	·
• To identify the loads on the structures and to knowwhere to find thecharacteristic values	·	·	✓	·	·

Manager : Fateh BENDAHMANE

Sustainable development and social responsability 1

Hours

Lect	Tut	PW	Proj	WP	Asst
		6			

Evaluation

One evaluation : *Pas d'évaluation*

Bibliography

- Travaux du GIEC
- Global carbon project

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-3	✓	·	·	·	·

Manager : Laurence CHARPENTIER

Sustainable development and social responsability 2

Hours

Lect	Tut	PW	Proj	WP	Asst
1.5	9				10

Evaluation

One evaluation : *Rapport+soutenance*

Bibliography

- Travaux du GIEC
  - Global carbon project

Learning outcomes

Learning outcomes	N	A	M	E	O
• TPN-3	·	✓	·	·	·
• TPN-5	·	✓	·	·	·

Manager : Laurence CHARPENTIER

Sustainable developpement in civil engineering

Hours

Lect	Tut	PW	Proj	WP	Asst
18.75					8

Evaluation

2 evaluations :

- *Soutenance*
- *Rapport*

Presentation

course and collective projet conducted by groups

Outline

* course : how to integrate users in the design, construction works and service life of a building or an urban planning project

* course: biodiversity and construction: generalities on biodiversity and ecosystem services, problems and solutions in construction

* collective projet in 4 steps:

1/ identify users, their needs through a role game and design thinking techniques

2/ seek for solutions linked with design of the building and/or its surrounding environment, select among solutions

3/ analyze selected solutions, present them (with a pitch) and confront them to actors and users with a role game

4/ improve and deepen the analysis of selected solutions, accounting for interactions with other actors, present solutions to public (posters)

Goals

Understan that there are no recipee for sustainable development.

Be able to conduct a sustainable development approach applied to the design of a building and/or of an urban planning.

Bibliography

ISO 14 040 sur l'Analyse de Cycle de Vie

ISO 14 001 et Emas sur le management environnemental

ISO 26 000 sur la Responsabilité Sociétale des Entreprises

Global Reporting Initiative

Prerequisites

Notions form other courses on sustainable development: concepts, economical, social and environmental stakes, territorial stakes, agenda 21

life cycle assessment

Learning outcomes

Learning outcomes	N	A	M	E	O
• Normes et initiatives internationales en développement durable	✓	·	·	·	·
• Enjeux du développement durable en construction	✓	·	·	·	·
• Identifier des moyens d'action et de leur évaluation dans un contexte professionnel	✓	·	·	·	·

Manager : Anne VENTURA

Thermodynamics and thermal sciences

Hours

Lect	Tut	PW	Proj	WP	Asst
17.5	19	8			24

Evaluation

3 evaluations :

- *Contrôle continu*
- *Devoir Surveillé*
- *Compte-rendu de TP*

Outline

Thermodynamics
1 Concept and definitions, 2 Properties of a pure substance, 3 Work and heat,
4 The first law of thermodynamics, 5 The second law of thermodynamics,
6 Power cycles, heat pump and refrigeration cycles.
Heat Transfer
Chapitre 1 Conduction
Chapitre 2 Convection
Chapitre 3 Heat radiation

Goals

This course will consider the fundamental science of classical thermodynamics and its practical applications in climate engineering. Presentation of the fundamental mechanisms of heat transfer.

Bibliography

VAN WYLEN, SONTAG, DESROCHERS, « Thermodynamique appliquée », 2ème édition, ERPI, Ottawa, Canada, 1992.

GICQUEL , « Systèmes énergétiques », tome 1 : Méthodologie d'analyse, bases de thermodynamiques, ,tome 2 : Applications classiques, tome 3 : Cycles avancés, systèmes innovants à faible impact environnemental, régime non-nominal, Presses des Mines, Paris, 2009

TAINE, PETIT, ?Transferts thermiques, introduction aux sciences de transfert?, 3ème édition, Dunod, Paris, 2003.

Prerequisites

none

Learning outcomes

Learning outcomes	N	A	M	E	O
• Apply the principles of thermodynamics to systems of practical engineering such as refrigeration or heat pump devices.	·	·	✓	·	·
• Calculate the main characteristics of simple heat or cooling systems.	✓	·	·	·	·
• Apply the techniques, tools required to solve typical thermal-related engineering problems.	·	·	✓	·	·

Manager : Annaig COTONNEC

Timber construction 1

Hours

Lect	Tut	PW	Proj	WP	Asst
10	15.25	4			16

Evaluation

2 evaluations :

- *Devoir surveillé*
- *Compte-rendu de TP*

Outline

1. Structural design basis : Limit States, Actions on structures, Service class, Geometrical data

2. Wood-based materials (Solid wood, Laminated timber) : Strength and stiffness parameters, characteristic values of material properties, Modification of wood properties induced by the load duration and the water content, Design values of material properties, Scale effects

3. Verification of the Eurocode 5 requirements : Service limit state (Admissible sag), Ultimate limit state (Strength of simple elements), Instabilities of simple elements, Notched elements, System effect, Bend and variable inertia elements

Goals

Simple elements of a wood structure are designed according to the calculation rules (Eurocode 5)

Bibliography

? STEP/EUROFORTECH, éd. Structures en bois aux états limites - Introduction à l'Eurocode 5, STEP 1 : Matériaux et Bases de calcul. SEDIBOIS, Eyrolles, 1996.

? Y. Benoît, B. Legrand et V. Tastet : Calcul des structures en bois - Guide d'application.AFNOR Éditions, Eyrolles, 2009.

? J. Natterer, J. L. Sandoz et M. Rey : Construction en bois - Matériau, technologie et dimensionnement, vol. 13 de Traité de Génie Civil de l'École polytechnique fédérale de Lausanne. Presses polytechniques et universitaires romandes, 2004

? Union nationale française des chambres syndicales de charpente; « Structures en bois aux états limites : introduction à l'Eurocode 5 », 1997

? Timber structures limit state: Introduction to Eurocode 5

Prerequisites

? Mechanics of Structures

? Structural safety and calculation

Learning outcomes

Learning outcomes	N	A	M	E	O
• Able to design and / or verify a wooden building under the current rules	·	·	✓	·	·

Manager : François BIGNONNET

Timber construction 2

Hours

Lect	Tut	PW	Proj	WP	Asst
16	13.75				15

Evaluation

2 evaluations :

- *Devoir surveillé*
- *Mini-projet*

Outline

1. Assembly of the wooden structure
   2. Notions about the fire behavior of the material wood
   2. Mini project:
   from a file plans architecture of wood construction, establish the calculation note structure following the rules, and implementation plans.

Goals

A second course to deepen the knowledge of wood as a building material.

Bibliography

? Natterer, Sandoz, Rey, Fiaux; « Construction en bois : Matériau, technologie et dimensionnement »; Presses polytechniques et universitaires romandes, 2004, ISBN : 2-88074-609-4

? Timber structures limit state: Introduction to Eurocode 5

? Natterer, Sandoz, Rey, Fiaux, "Wood Construction: Materials, technology and design" polytechnic and university presses romandes, 2004, ISBN: 2-88074-609-4 (in French)

Prerequisites

? Mechanics of Structures
   ? Security et stability of constructions
   ? CAD software
   ? Timber Construction 2

Learning outcomes

Learning outcomes	N	A	M	E	O
• knowledge the fire behavior of wood material	✓	·	·	·	·
• Able to design and / or verify a wooden building under the current rules	·	✓	·	·	·

Manager : Abdelhafid KHELIDJ

Town and coast planning in the face of climate changes

Hours

Lect	Tut	PW	Proj	WP	Asst
24	9.5	4			21

Evaluation

3 evaluations :

- *Soutenance*
- *Examen*
- *Rapport R.SIGWALD*

Bibliography

* Guide Enrochement : L'utilisation des enrochements dans les ouvrages hydrauliques. CIRIA, CUR, CETMEF, Compiègne , CETMEF - 2009.

* Break waters, coastal structures nd coastlines, NWH ALLOP, Thomastelford 2001,

Learning outcomes

Learning outcomes	N	A	M	E	O
• To know the diversity of the environmental aspects take into account in management,	·	✓	·	·	·
• To know specificities of the maritime and littoral environment	·	✓	·	·	·
• To know and limit the environmental impacts of littoral management.	·	✓	·	·	·
• Pluvial networks design in cities	·	·	✓	·	·
• xxx	✓	·	·	·	·
• xxx	✓	·	·	·	·

Manager : Stéphane LAIGLE

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 : *CC*

Training period 3

Hours

Lect Tut PW Proj WP Asst

Evaluation

3 evaluations :

- *Travail réalisé*
- *Rapport*
- *Soutenance*

Outline

Aimed competences : * To conceive and design wood, steel, reinforced concrete works and their elements of technical equipment. * To develop and install a fuctional and durable works which save energy. * Work management(from preparation to reception): to manage the work execution , teams and finances. * To treat problems related on the public space designing, the quality of life and environment and the urban waste processing.

Goals

To give to the future engineer a experience of a management project with analyses, to supplement its formation by a pratical experience and to prepare it to the function of engineer.

Prerequisites

Program GC3, GC4 et GC5.

Learning outcomes

Learning outcomes	N	A	M	E	O
• To be able to treat in an autonomous way a complex problem in one of the scientific and/or technical disciplines of the speciality.	·	·	·	✓	·
• To know how to manage a project with method and organization	·	·	·	✓	·
• To show its ability to acquire new knowledge, scientific, technical or technological competences	·	·	✓	·	·
• To know how to make progress in the entreprise by taking into account the industrial, economic, social, regulation and environmental problems	·	·	✓	·	·
• To know how to be integrated in a team, to manage the hierarchical relations and to communicate with his/her collaborators	·	·	·	✓	·
• To know how to write a technical report and to expose scientific and technical results	·	·	·	✓	·

Manager : Anne-Sophie ENEE

Training period GC3

Hours

Lect	Tut	PW	Proj	WP	Asst
				8	

Evaluation

One evaluation : *Evaluation Stage GC3*

Manager : Stéphane LAIGLE

Training period GC4

Hours

Lect	Tut	PW	Proj	WP	Asst
				8	

Evaluation

One evaluation : *Evaluation*

Manager : Fateh BENDAHMANE

Transportation engineering and smart mobility

Hours

Lect	Tut	PW	Proj	WP	Asst
28	27	4	8		30

Evaluation

5 evaluations :

- *CR de visite*
- *DS Transport*
- *TD*
- *DS Terrassement*
- *DS Voirie*

Bibliography

Métropolisation et grands équipements structurants - S Corinne, L Florence, L Frédéric, J Marie-Christine -Presses universitaires du Mirail - DL 2004

GTR, bible Caterpilar, Norme à jour sur le dimensionnement, Normes enrobé

Learning outcomes

Learning outcomes	N	A	M	E	O
• To understand an urban transport network	✓	·	·	·	·
• Infrastructure design of the of a THLS line	·	✓	·	·	·
• Design XX	·	✓	·	·	·
• XX	·	✓	·	·	·
• XXX	✓	·	·	·	·

Manager : Stéphane LAIGLE

Urban planning

Hours

Lect	Tut	PW	Proj	WP	Asst
10	1.5	4	16		12

Evaluation

One evaluation : *Devoir surveillé*

Prerequisites

None

Learning outcomes

Learning outcomes	N	A	M	E	O
• To know the different parties involved in urban planning	·	·	✓	·	·
• To grasp the important issues of contemporary urban and city planning	✓	·	·	·	·
• To understand the general process about urban form production	✓	·	·	·	·
• To know and analyze local references of urban projects	·	✓	·	·	·

Manager : Nabil ISSAADI

Ventilation - air conditioning

Hours

Lect	Tut	PW	Proj	WP	Asst
12.5	16.5	4			17

Evaluation

3 evaluations :

- *Compte-rendu de TP*
- *Devoir surveillé*
- *Contrôle continu*

Outline

Part A - Ventilation

1. Ventilation standards
2. Types of ventilation
3. Air distribution
4. Fans

Part B - Air conditioning

1. Air Psychrometrics
2. Design parameters related to an air conditioning system
3. Psychrometric processes
4. Room sensible and latent heat loads - Caracteristics of supply air
5. Air conditioning systems

Goals

From the estimated needs to the final installation of ventilation and air conditioning.

Bibliography

- Brogat, Lanchon, Fontan; « Ventilation des bâtiments »; CSTB, 2003
- Bouteloup; « Climatisation et conditionnement d'air »; Editions parisiennes, 2001
- Porcher; « Cours de climatisation bases du calcul des installations de climatisation »; Editions parisiennes, 1993

Prerequisites

Thermodynamics - Heat transfer - semester 6
Fluid mechanics - semester 6

Learning outcomes

Learning outcomes	N	A	M	E	O
• Understanding a ventilation and air conditioning specification	·	·	✓	·	·
• Design of air distribution pipe	·	✓	·	·	·
• Design of air conditioning system	·	✓	·	·	·

Manager : Anne-Sophie ENEE