People's Democratic Republic of Algeria

Ministry of Higher Education and Scientific Research

National Pedagogical Committee for the Science and Technology

Harmonized Academic Master

National Program
Updated in 2022

Field	Program	Speciality
Science and Technology	***Civil Engineering***	***Materials in Civil Engineering***

Master's identity card

Admission requirements

Program	Harmonized Master	BSc Degrees Granting Access to the Master	Ranking based on the compatibility of BSc	Coefficient assigned to the BSc
Civil Engineering	**Materials in Civil Engineering**	Civil Engineering	**1**	**1.00**
		Public Works	**1**	**1.00**
		Hydraulics	**2**	**0.80**
		Materials Engineering	**2**	**0.80**
		Materials Chemistry	**2**	**0.80**
		Materials Physics	**2**	**0.80**
		Metallurgy	**3**	**0.70**
		Other BSc in the ST Field	**5**	**0.60**

Semester-based course organization sheets of the speciality

Semester 1 Master: Materials in Civil Engineering

Teaching unit	Subject	Credits	Coefficient	Weekly number of hours			Semester number of hours (15 Weeks)	Supplementary work through consultation (15 weeks)	assessment methods	
	Title			Course	TW	PW			Continuous assessment	Exam
Fundamental CU Code: FCU 1.1.1 Credits: 6 Coefficients: 4	Theory of elasticity	4	2	1h30	1h30		45h00	55h00	40%	60%
	Mineral binders	4	2	1h30	1h30		45h00	55h00	40%	60%
Fundamental CU Code: FCU 1.1.2 Credits: 10 Coefficients: 5	Concrete technology	4	2	1h30	1h30		45h00	55h00	40%	60%
	Reinforced Concrete Structures	6	3	3h00	1h30		67h30	82h30	40%	60%
methodological CU Code: MCU 1.1 Credits: 9 Coefficients: 5	PW materials physics	2	1			1h30	22h30	27h30	100%	
	PW binders	3	2			2h30	37h30	37h30	100%	
	PW concrete technology	4	2			3h00	45h00	55h00	100%	
Discovery CU Code: DCU 1.1 Credits: 2 Coefficients: 2	Elective course	1	1	1h30			22h30	02h30		100%
	Elective course	1	1	1h30			22h30	02h30		100%
Transversal CU Code: TCU 1.1 Credits: 1 Coefficients: 1	Technical English and terminology	1	1	1h30			22h30	02h30		100%
Total semester 1		**30**	**17**	**12h00**	**6h00**	**7h00**	**375h00**	**375h00**		

Semester 2 Master: Materials in Civil Engineering

Teaching unit	Subject	Credits	Coefficient	Weekly number of hours			Semester number of hours (15 Weeks)	Supplementary work through consultation (15 weeks)	assessment methods	
	Title			Course	TW	PW			Continuous assessment	**Exam**
Fundamental CU Code: FCU 1.2.1 Credits: 10 Coefficients: 5	Plasticity and damage	6	3	3h00	1h30		67h30	82h30	40%	60%
	Special construction materials	4	2	3h00			45h00	55h00		100%
Fundamental CU Code: FCU 1.2.2 Credits: 6 Coefficients: 4	Innovative concretes 1	4	2	3h00			45h00	55h00		100%
	Metal frame works	4	2	1h30	1h30		45h00	55h00	40%	60%
methodological CU Code: MCU 1.2 Credits: 9 Coefficients: 5	PW Mechanics of Materials	2	1			1h30	22h30	27h30	100%	
	Computer applications in the design of reinforced concrete structures	3	2			2h30	37h30	37h30	100%	
	Experimental method	4	2	1h30		1h30	45h00	55h00	40%	60%
Discovery CU Code: DCU 1.2 Credits: 2 Coefficients: 2	Elective course	1	1	1h30			22h30	2h30		100%
	Elective course	1	1	1h30			22h30	2h30		100%
Transversal CU Code: TCU 1.2 Credits: 1 Coefficients: 1	Compliance with standards and ethical and integrity rules	1	1	1h30			22h30	02h30		100%
Total semester 2		**30**	**17**	**16h30**	**3h00**	**5h30**	**375h00**	**375h00**		

Semester 3 Master: Materials in Civil Engineering

Teaching unit	Subject	Credits	Coefficient	Weekly number of hours			Semester number of hours (15 Weeks)	Supplementary work through consultation (15 weeks)	assessment methods	
	Title			Course	TW	PW			Continuous assessment	Exam
Fundamental CU Code: FCU 2.1.1 Credits: 12 Coefficients: 6	Composite materials	4	2	1h30	1h30		45h00	55h00	40%	60%
	Recycled materials	4	2	1h30	1h30		45h00	55h00	40%	60%
	Prestressed concrete	4	2	1h30	1h30		45h00	55h00	40%	60%
Fundamental CU Code: FCU 2.1.2 Credits: 6 Coefficients: 3	Materials Durability	4	2	3h00			45h00	55h00		100%
	Innovative concretes 2	2	1	1h30			22h30	27h30		100%
methodological CU Code: MCU 2.1 Credits: 9 Coefficients: 5	Finite elements	4	2	1h30		1h30	45h00	55h00	40%	60%
	PW Durability of materials	2	1			1h30	22h30	27h30	100%	
	PW Innovative concretes	3	2			2h30	37h30	37h30	100%	
Discovery CU Code: DCU 2.1 Credits: 2 Coefficients: 2	Elective Course	1	1	1h30			22h30	02h30		100%
	Elective Course	1	1	1h30			22h30	02h30		100%
Transversal CU Code: TCU 2.1 Credits: 1 Coefficients: 1	Literature review and thesis design	1	1	1h30			22h30	02h30		100%
Total semester 3		**30**	**17**	15h00	4h30	5h30	**375h00**	**375h00**		

CU Discovery (S1, S2, S3)

1. Building thermal performance
2. Building thermal performance
3. Material rheology
4. Hydration and structuring of cement pastes
5. Design of experiments
6. Construction pathology
7. Business organization and management
8. Construction site management
9. Introduction to civil and industrial constructions
10. Public procurement code
11. Introduction to hydraulic structures

Semester 4

Internship in a company or research laboratory, concluded with a thesis and an oral defense.

	SHV	Coeff	Credits
Personal work	550	09	18
Internship in a company or laboratory	100	04	06
Seminars	50	02	03
Other (Supervision)	50	02	03
Total semester 4	750	17	30

Evaluation of the Master's Thesis Project

- Scientific value (jury's assessment) /6
- Thesis writing (jury's assessment) /4
- Presentation and response to questions (jury's assessment) /5
- Supervisor's assessment /3
- Internship report presentation (jury's assessment) /5

Detailed course program by subject for semester S1

Semester: 1
Teaching unit: FCU 1.1.1
Subject: Theory of elasticity
SHV: 45h00 (Course: 1h30, TW: 1h30)
Credits: 4
Coefficient: 2

Teaching objectives:

Define the behavior of solid elastic continua, understand the deformation mechanisms of materials in the elastic domain, and be able to perform basic calculations.

Recommended prior knowledge:

Differential equations, Strength of materials

Course content:

Chapter 1. General overview of the theory of elasticity (3 Weeks)

Chapter 2. Theory of the stress state (4 Weeks)

Chapter 3. Theory of the strain state (4 Weeks)

Chapter 4. Stress–Strain relationships (4 Weeks)

assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references:

TIMOSHENKO (S.P.) et GOODIER (J.N.). – Théorie de l'élasticité.544 p., 2 éd. Béranger (1961
COURBON (J.). – Calcul des structures.Dunod (1972).
F.FREY, Analyse des structures et milieux continus méthode des éléments finis volume 6, p.p.u.r.
J.COURBON, Plaques minces élastiques. Eyrolles
R.L'HERMITE,Leflombageélasto-plastique des systèmes de barres droites. Eyrolles
S.TIMOSHINKO, Théorie de la stabilité élastique. Dunod
A.PFLUGER, Élément de statique des coques. Dunod
M. Tichy et J. Rakosnik, « Calcul plastique des ossatures en béton », Eyrolles, 1975.
William A. Nash, « Résistance des matériaux 1: Cours et problèmes », série Schaum,

Semester: 1
Course unit: FCU 1.1.1
Subject: Mineral binders
SHV: 45h00 (Course: 1h30, TW: 1h30)
Credits: 4
Coefficient: 2

Teaching objectives:

Understanding Binders (Air-setting and hydraulic): composition, manufacturing, properties, and uses.

Recommended prior knowledge:

General chemistry, Materials in civil engineering

Course content:

Chapter 1. Classification of binders and standards overview

Chapter 2. Ordinary cements and their components

Manufacturing, properties, standards, and uses

Chapter 3. Hydraulic lime

Manufacturing, properties, standards, and uses

Chapter 4. Air lime

Manufacturing, properties, standards, and uses

Chapter 5. Gypsum (Plaster)

Manufacturing, properties, standards, and uses

assessment method:

Continuous assessment: 40 %; Exam: 60 %.

Bibliographic references:

Semester: 1
Course unit: FCU 1.1.2
Subject: Concrete technology
SHV: 45h00 (Course: 1h30, TW: 1h30)
Credits: 4
Coefficient: 2

Teaching objectives:

Describe the components of concrete, the main mix design methods, and the technological solutions in terms of mixing, placing, additives, mineral additions, and admixtures.

Recommended prior knowledge:

Physical and chemical properties of materials. Construction materials.

Course content:

Chapter 2. Chemical admixtures	(2 weeks)
Chapter 3. Mineral additions	(2 weeks)
Chapter 4. Concrete mix design	(3 weeks)
Chapter 5. Properties of fresh and hardened concrete	(3 weeks)
Chapter 6. Shrinkage and creep of concrete	(1 week)
Chapter 6. Concrete placement and execution	(1 week)
Chapter 7. Concrete quality control and assurance	(1 week)
Chapter 8. Recent advances in concrete technology	(1 week)

assessment method:

Continuous assessment: 40%; Exam: 60 %.

Bibliographic references:

1. Neville M.A., (2000), Propriétés des bétons. Ed. Eyrolles, France, 806p.
2. Mehta P.K., Monteiro P.J.M., (2003), Concrete: Structure, Properties and Materials, Third Edition, Prentice-Hall, 652p.
3. Aitcin P.C., (2008), Binders for Durable and Sustainable Concrete, Ed. Taylor & Francis, 529p.
4. Aitcin P.C., (2000), Bétons haute performance, Ed. Eyrolles France,700p.
5. Siddique R., (2008), Waste materials and by-products in concrete, Ed. Springer-Verlag Berlin Heidelberg, 427p.
6. Ollivier J-P., Baron J., (1997), Les bétons: Bases et données pour leur formulation, Ed Eyrolles, 522p.
7. Newman J., Choo B.S., (2004), Advanced Concrete Technology 1, Constituent Materials, Elsevier Edition, 288p.
8. Newman J., Choo B.S., (2004), Advanced Concrete Technology 2, Concrete Properties, Elsevier Edition, 352p

Semester: 1
Course unit: FCU 1.1.2
Subject: Reinforced Concrete Structures
SHV: 45h00 (Course: 3h00, TW: 1h30)
Credits: 6
Coefficient: 3

Teaching objectives:

Choose and use appropriate calculation methods for preliminary design and detailed design of the structural elements.

Recommended prior knowledge:

Calculation of applied loads, Calculation of straight sections in reinforced concrete (simple tension, simple compression, simple bending, combined bending, buckling).

Course content:

Chapter 1: Floors and slabs	(3 weeks)
Chapter 2: Stairs	(1 week)
Chapter 3: Beams	(3 weeks)
Chapter 4: Columns	(2 weeks)
Chapter 5: Shear walls	(3 weeks)
Chapter 6: Foundations	(3 weeks)

Bibliographic references:

1- Georges Dreux, « Calcul pratique du béton armé. Règles B.A.E.L 80 », Eyrolles, 1981.
2- A. Guerrin et R. C. Lavaur, « Traité de béton armé ; Propriétés générales mécanique expérimentale du béton armé, Tome 1 », Dunod, 1973.
3- A. Guerrin et R. C. Lavaur, « Traité de béton armé ; Ossatures d'immeubles et d'usines, planchers, escaliers, encorbellements, ouvrages divers du bâtiment, Tome 4 », Dunod, 1971.
5- A. Guerrin et R. C. Lavaur, «Traité de béton armé ; Murs de soutenement et murs de quai, Tome 7 », Dunod, 1976.
6- Jean Pierre Mougin, « Béton armé, BAEL 91 modifié 99 et DTU associés », Eyrolles, 2000.
7- M. Albiges et M. Mingasson, « Théorie et Pratique du béton armé aux états limites », Eyrolles, 1981.
8- Règles BAEL 91, « Règles techniques de conception et de calcul des ouvrages et constructions en béton armé suivant la méthode des états limites », Eyrolles, mars 1992.
9- H. Renaud et F. Letertre, « Ouvrages en béton armé », Foucher, 1985.
10- Georges Dreux, « Nouveau guide du béton », Eyrolles, 1985.
11- Georges Dreux, « Calcul pratique du béton armé. Règles BAEL 83 », 1983
12- R. Park et T. Paulay, « Reinforcedconcrete structures », John Wiley et Sons.
13- Eurocode 2, Calcul des structures en béton - Partie 1-1: règles générales et règles pour les bâtiments, NF EN 1992-1-1 Octobre 2005.
14- Christian Albouy, « Eurocode2: béton armé - éléments simples », CERPET – STI, 2007.
15- J. A. Calgaro, « Applications de l'Eurocode 2 - Calcul des bâtiments en béton », ponts et chaussée, 2007.

Semester:1
Course unit: MCU 1.1
Subject: PW materials physics
SHV: 22h30 (PW: 1h30)
Credits: 2
Coefficient: 1

Teaching objectives:

Know and perform the various physical tests on construction materials.

Recommended prior knowledge:

Physical and chemical properties of materials. Construction materials.

Course content:

PW 1: Particle size analysis (sieve analysis)

PW 2: Bulk Density

PW 3: Moisture content and water absorption

PW 4: Micro-Deval Test, Los Angeles test, dynamic diffraction

PW 5: Aggregate cleanliness (clay and dust content)

PW 6: Mechanical strength tests

assessment method:

Continuous assessment: 100% ; Exam: 0%.

Bibliographic references:

Semester:1
Course unit: MCU 1.1
Subject: PW binders
SHV: 37h30 (PW: 2h30)
Credits: 3
Coefficient: 2

Teaching objectives:

Characterize mineral binders (gypsum, lime, and cements).

Recommended prior knowledge:

Physical and chemical properties of materials. Construction materials and mineral binders.

Course content:

PW 1. Tests on Cement:

- Setting time test
- Laser granulometry (particle size analysis)
- Loss on ignition
- Insoluble residue
- Fineness
- Bulk density
- X-ray fluorescence (XRF) analysis
- Mineralogical analysis by X-ray diffraction (XRD)
- Determination of compressive strength
- Determination of flexural strength

PW 2. Tests on Hydraulic Lime:

- Determination of initial setting time
- Determination of volumetric stability
- Determination of compressive strength

PW 3. Tests on Air Lime (Non-hydraulic Lime):

- Determination of calcium oxide and magnesium oxide content
- Determination of active lime content
- Determination of quicklime reactivity
- Determination of grinding fineness

PW 4. Tests on Gypsum:

- Determination of pouring and smoothing time
- Determination of grinding fineness
- Determination of compressive strength
- Determination of flexural strength
- Determination of impurity content

assessment method:

Continuous assessment: 100% ; Exam: 0 %.

Bibliographic references:

Semester: 1
Course unit: MCU 1.1
Subject: PW concrete technology
SHV: 45h00 (PW: 3h00)
Credits: 4
Coefficient:2

Teaching objectives:

Learning practical work and introduction to experimental methods.

Recommended prior knowledge:

Construction materials, Concrete technology.

Course content:

PW 1: Concrete mix design
– Dreux-Gorisse method
– Baron-Lesage method

PW 2: Workability Tests
– Abrams cone, LCPC Workability meter, etc.

PW 3: Effect of Admixture on Concrete
– Tests on slurry, saturation dosage, etc.

PW 4: Mechanical Tests
– Compression, bending, splitting tests

assessment method:

Continuous assessment: 100 % ; Exam: 0 %.

Bibliographic references:

Semester: 1
Course unit: TCU 1.1
Subject: Technical English and terminology
SHV: 22h30 (Course: 1h30)
Credits: 1
Coefficient: 1

Teaching objectives:

Introduce the student to technical vocabulary. Strengthen their language skills. Help them understand and synthesize a technical document. Enable them to comprehend a conversation in English held in a scientific context.

Recommended prior knowledge:

Basic vocabulary and grammar in English

Course content:

- Reading Comprehension: Reading and analysis of texts related to the field of specialization.
- Listening Comprehension: Using authentic scientific outreach videos, note-taking, summarizing, and presenting the content.
- Oral Expression: Presenting a scientific or technical topic, developing and exchanging oral messages (ideas and data), telephone communication, and gestural expression.
- Written Expression: Extracting ideas from a scientific document, writing a scientific message, exchanging information in writing, drafting CVs, cover letters for internships or job applications.

Recommandation:

It is strongly recommended that the Subject Coordinator present and explain at the end of each session (at most) ten technical terms related to the field of study in three languages (if possible): English, French, and Arabic.

assessment method:

Exam: 100%.

Bibliographic references:

1. P.T. Danison.Guide pratique pour rédiger en anglais: usages et règles, conseils pratiques. Editions d'Organisation.
2. A. Chamberlain, R. Steele.Guide pratique de la communication: anglai.Ed. Didier.
3. R. Ernst.Dictionnaire des techniques et sciences appliquées: français-anglais. Ed.Dunod.
4. J. Comfort, S. Hick, A. Savage.Basic Technical English.Ed. Oxford University Press.
5. E.H. Glendinning, N. Glendinning.Oxford English for Electrical and Mechanical Engineering.Ed. Oxford University Press.
6. T.N. Huckin, A.L. Olsen.Technical writing and professional communication for nonnative speakers of English.Ed. McGraw-Hill.
7. J. Orasanu.Reading Comprehension from Research to Practice.Ed. Erlbaum Associates.

Detailed course program by subject for semester S2

Semester: 2
Course unit: FCU 1.2.1
Subject: Plasticity and damage
SHV: 67h30 (Course: 3h00, DW: 1h30)
Credits: 6
Coefficient: 3

Teaching objectives:

Understand the deformation mechanisms of materials in the plastic domain and enable students to design structures within this domain.

Recommended prior knowledge:

Differential equations. Strength of materials. Elasticity.

Course content:

Chapter 1: Introduction

Chapter 2: Appearance and phenomenon

Chapter 3: Behavior and plasticity criterion

Chapter 4: Plastic behavior law

Chapter 5: Plastic flow law

Chapter 6: Plastic analysis method

Chapter 7: Linear elastic fracture mechanics

Chapter 8: Extension of fracture mechanics

Chapter 9: Material fatigue

assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references:

C. Wielgosz, RDM, élasticité, plasticité, éléments finis, Ed Ellipses.
R. Guenfoud, introduction à la théorie non linéaire, Ed DPU Guelma
M. Tichy et j. Rakosnik, « calcul plastique des ossatures en béton », eyrolles, 1975.

Semester: 2
Course unit: FCU 1.2.1
Subject: Special construction materials
SHV: 45h00 (Course: 3h00)
Credits: 4
Coefficient: 2

Teaching objectives:

Provide students with knowledge about other materials used in the construction field, as well as their properties.

Recommended prior knowledge:

Construction materials 1

Course content:

Chapter 1: Wood

Chapter 2: Glass

Chapter 3: Ceramic materials

Chapter 4: Bituminous materials

Chapter 5: Polymers

Chapter 6: Compressed earth products

assessment method:

Continuous assessment: 0%; Exam: 100%.

Bibliographic references:

Semester: 2
Course unit: FCU 1.2.2
Subject: Innovative concretes 1
SHV: 45h00 (Course: 3h00)
Credits: 4
Coefficient: 2

Teaching objectives:

Design innovative materials for targeted civil engineering applications and consider materials with a wide range of predefined properties within the framework of a construction project.

Recommended prior knowledge:

Construction materials, Concrete technology

Course content:

Chapter 1: Properties and performances of materials

Chapter 2: High-Performance concrete

Chapter 3: Self-Compacting concrete

Chapter 4: Fiber-Reinforced concrete

Chapter 5: Reactive Powder concrete

Chapter 6: Polymer-Based concrete

Chapter 7: Lightweight concrete

Chapter 8: Heavyweight concrete

Chapter 9: Concrete with recycled aggregates

assessment method:

Continuous assessment: 0%; Exam: 100%.

Bibliographic references:

Jean-Marie Renouard, Gilles Pijaudier-Cabot. Comportement mécanique du béton, chapitre 8. Lavoisier 2005. p 283

G. D.Taylor. Materials in Construction. 3rd ed. Longman 2000

P. K. Mehta and P. J. Monterio. Concrete Microstructure, properties and materials. 3rd McGraw-Hill. 2006 p.659

Bill Price, B H P. Advanced concrete technology. Chapter 3. Elsevier LDW. 2003 p.

Caijun Shi. Y. Mo. High performance construction materials. World Scientific Publishing. 2008 p.431

C. Hall. Civil Engineering materials. 5th ed. 1996 p. 527

H. F. W. Taylor. Cement Chemistry. 2nd ed. 1997 p. 469

G D Taylor. Materials in construction (2000), 3 ed. 332p

Semester: 2
Course unit: FCU 1.2.2
Subject: Metal frame works
SHV: 45h00 (Course: 1h30, DW: 1h30)
Credits: 4
Coefficient: 2

Teaching objectives:

Design structural elements and simple welded or bolted connections using Eurocode 3.

Recommended prior knowledge:

Structural Mechanics- Plotting diagrams (M, N, T) for structures - different methods of analysis (trusses, continuous beams, frames).

Course content:

Chapter 1: Calculation of connections (6 weeks)

- Welding
- Ordinary Bolts
- HR Bolts with Controlled tightening

Chapter 2: Calculation of column bases (4 weeks)

- Hinged connection
- Fixed connection

Chapter 3: Calculation of Composite Slabs (3 weeks)

- Strength calculation
- Deformation calculation
- Connector calculation

Chapter 4: Design of industrial buildings (Halls) (2 weeks)

assessment method:

Continuous assessment: 0%; Exam: 100%.

Bibliographic references:

1- Règles de calcul des constructions en acier (CM66), Eyrolles, 1979.
2- Règles définissant les effets de la neige et du vent sur les constructions et annexes (Règles N.V.65), Eyrolles, 1980.
3- Eurocode 3, « Calcul des structures en acier », NF EN 1993-1-1, 2005.
4- J.MOREL, Conception et calcul des structures métalliques, Eyrolles
5- J.brozzetti, Calcul des structures en acier: eurocode 3, Eyrolles
6- A. Manfred, Charpente métallique: conception et dimensionnement des halles et bâtiments volume 11, PPEUR

Semester: 2
Course unit: MCU 1.2
Subject: PW Mechanics of Materials
SHV: 22h30 (PW: 1h30)
Credits: 2
Coefficient: 1

Teaching objectives:

Identify the mechanical properties of materials and understand the influence of various parameters.

Recommended prior knowledge:

Construction materials, Concrete technology

Course content:

PW 1: Mechanical tests (compression, tension, bending)

PW 2: Effects of various parameters on the mechanical properties of materials

- Effect of the water/cement Ratio
- Effect of curing
- Effect of additives

PW 3: Rheology of concrete - determination of shear threshold and plastic viscosity

PW 4: Scale effect on the properties of mortar and concrete specimens

PW 5: Tension tests on steel

PW 6: Bonding tests (steel-concrete)

assessment method:

Continuous assessment: 100 %

Bibliographic references:

Semester: 2
Course unit: MCU 1.2
Subject: Computer applications in the design of reinforced concrete structures
SHV: 37h30 (PW: 2h30)
Credits: 3
Coefficient: 2

Teaching objectives:

Train students in the use of professional software that enables them to design and calculate structures.

Recommended prior knowledge:

Physical and chemical properties of materials. Construction materials, Mineral binders

Course content:

Training in Software

- Representation of the structure in three dimensions (modeling) using bars and plates
- Setting up connections between bars and with the external environment
- Application of loads: self-weight, snow and wind, live loads
- Calculation and determination of stresses in the various elements
- Calculation of reinforced concrete elements

assessment method:

Continuous assessment: 100 %

Bibliographic references:

Semester: 2
Course unit: MCU 1.2
Subject: Experimental method
SHV: 45h00 (Cours1h30, PW: 1h30)
Credits: 4
Coefficient: 2

Teaching objectives:

Mastery of advanced experimental investigation techniques.

Recommended prior knowledge:

Construction Materials Course taught in the BSc program.

Course content:

Chapter 1: Classical methods – description and application

- Gravimetry
- Volumetry
- Differential thermal analysis
- Calorimetric analysis

Chapter 2: Physical and physico-chemical methods – description and application

- Emission and X-ray fluorescence spectroscopy
- X-ray diffraction
- Scanning electron microscopy

Chapter 3: Mechanical methods

- Static testing
- Dynamic testing
- Strain measurement

assessment method:

Continuous assessment: 40 ; Exam: 60 %.

Bibliographic references:

1. Wheeler A.J. and Ganji A.R. (1996), "Introduction to Engineering Experimentation", Prentice Hall, 417p.
2. Malhotra and Carino, "Handbook of Nondestructive Testing of Concrete", CRC Press, 1991
3. Montgomery, D.C. and Runger, G.C. (2003), "Applied Statistics and probability for engineers", 3rd Ed., John Wiley & Sons, 922p.
4. Goupy J. (2005), "Pratiquer les plans d'expériences". Dunod. Paris. 551p.
5. Placko D. (2000), "Fundamentals of Instrumentation and Measurement", Hermes Science Europe LDW, 555p.
6. Technique de l'ingénieur

Semester: 2
Course unit: TCU 1.2
Subject: Compliance with standards and ethical and integrity rules.
SHV: 22h30 (Course: 1h30)
Credit: 1
Coefficient: 1

Teaching objectives:

Develop students' awareness of the ethical principles and rules governing university life and the workplace. Raise their awareness of respecting and valuing intellectual property. Educate them about the risks of moral wrongs such as corruption and how to combat them, as well as alert them to the ethical challenges raised by new technologies and sustainable development.

Recommended prior knowledge:

Ethics and deontology (the foundations)

Course content:

A. Respect for Ethical Rules and Integrity

1. **Reminder of the MESRS Ethics and Deontology Charter:** Integrity and honesty. Academic freedom. Mutual respect. Demand for scientific truth, objectivity, and critical thinking. Fairness. Rights and obligations of students, teachers, administrative, and technical staff.
2. **Integrity and Responsible Research**
   - Respect for ethical principles in teaching and research
   - Responsibilities in teamwork: Equal professional treatment. Actions against discrimination. Pursuit of the common good. Inappropriate behavior in collective work
   - Adopting responsible behavior and combating misconduct: Responsible conduct in research. Scientific fraud. Actions against fraud. Plagiarism (definition, types of plagiarism, procedures to avoid unintentional plagiarism, plagiarism detection, penalties for plagiarists, etc.). Fabrication and falsification of data.
3. **Ethics and Deontology in the Workplace:**
   - Legal confidentiality in business
   - Loyalty to the company
   - Responsibility within the company
   - Conflicts of interest
   - Integrity (corruption in the workplace, its forms, consequences, and anti-corruption measures and sanctions)

B. Intellectual Property

I. Fundamentals of Intellectual Property

- Industrial property. Literary and artistic property.
- Rules for citing references (books, scientific articles, conference communications, theses, dissertations, etc.).

II. Copyright

1. Copyright in the digital environment
   - Introduction
   - Copyright of databases, copyright of software
   - Specific case of free software
2. Copyright on the Internet and E-commerce
   - Domain name rights
   - Intellectual property on the Internet

- E-commerce site rights
- Intellectual property and social networks

3. Patents

- Definition
- Rights in a patent
- The usefulness of a patent
- Patentability
- Patent application in Algeria and worldwide.

III. Protection and Valorization of Intellectual Property

- How to protect intellectual property
- Violations of rights and legal tools
- Valorization of intellectual property
- Protection of intellectual property in Algeria.

C. Ethics, Sustainable Development, and New Technologies

- The link between ethics and sustainable development, energy efficiency, bioethics, and new technologies (artificial intelligence, scientific progress, humanoids, robots, drones).

assessment method:

Exam: 100 %

Bibliographic references:

1. Charte d'éthique et de déontologie universitaires, https://www.mesrs.dz/documents/12221/26200/Charte+fran__ais+d__f.pdf/50d6de61-aabd-4829-84b3-8302b790bdce
2. Arrêtés N°933 du 28 Juillet 2016 fixant les règles relatives à la prévention et la lutte contre le plagiat
3. L'abc du droit d'auteur, organisation des nations unies pour l'éducation, la science et la culture(UNESCO)
4. E. Prairat, De la déontologie enseignante. Paris, PUF, 2009.
5. Racine L., Legault G. A., Bégin, L., Éthique et ingénierie, Montréal, McGraw Hill, 1991.
6. Siroux, D., Déontologie: Dictionnaire d'éthique et de philosophie morale, Paris, Quadrige, 2004, p. 474-477.
7. Medina Y., La déontologie, ce qui va changer dans l'entreprise, éditions d'Organisation, 2003.
8. Didier Ch., Penser l'éthique des ingénieurs, Presses Universitaires de France, 2008.
9. Gavarini L. et Ottavi D., Éditorial. de l'éthique professionnelle en formation et en recherche, Recherche et formation, 52 | 2006, 5-11.
10. Caré C., Morale, éthique, déontologie. Administration et éducation, 2e trimestre 2002, n°94.
11. Jacquet-Francillon, François. Notion: déontologie professionnelle. Le télémaque, mai 2000, n° 17
12. Carr, D. Professionalism and Ethics in Teaching. New York, NY Routledge. 2000.
13. Galloux, J.C., Droit de la propriété industrielle. Dalloz 2003.
14. Wagret F. et J-M., Brevet d'invention, marques et propriété industrielle. PUF 2001
15. Dekermadec, Y., Innover grâce au brevet: une révolution avec internet. Insep 1999
16. AEUTBM. L'ingénieur au cœur de l'innovation. Université de technologie Belfort-Montbéliard
17. Fanny Rinck etléda Mansour, littératie à l'ère du numérique: le copier-coller chez les étudiants, Université grenoble 3 et Université paris-Ouest Nanterre la défense Nanterre, France
18. Didier DUGUEST IEMN, Citer ses sources, IAE Nantes 2008

19. Les logiciels de détection de similitudes: une solution au plagiat électronique? Rapport du Groupe de travail sur le plagiat électronique présenté au Sous-comité sur la pédagogie et les TIC de la CREPUQ
20. Emanuela Chiriac, Monique Filiatrault et André Régimbald, Guide de l'étudiant: l'intégrité intellectuelle plagiat, tricherie et fraude… les éviter et, surtout, comment bien citer ses sources, 2014.
21. Publication de l'université de Montréal, Stratégies de prévention du plagiat, Intégrité, fraude et plagiat, 2010.
22. Pierrick Malissard, La propriété intellectuelle: origine et évolution, 2010.
23. Le site de l'Organisation Mondiale de la Propriété Intellectuelle www.wipo.int
24. http://www.app.asso.fr/

Detailed course program by subject for semester S3

Semester: 3
Course unit: FCU 2.1.1
Subject: Composite materials
SHV: 45h00 (Course: 1h30, DW 1h30)
Credits: 4
Coefficient: 2

Teaching objectives:

Gain basic knowledge of composite materials. Acquire the fundamental concepts for developing composites and later addressing all the design issues of laminated or sandwich structures.

Recommended prior knowledge:

Organic chemistry, Construction materials, Strength of materials, Mechanics of continuous media

Course content:

1. General concepts
2. History, definition, classification, and applications of composites
2. Composition of Composites
3. Reinforcements or reinforcing fibers
4. Matrices (resins)
5. Additives
6. Laminates (multilayers)
3. Composite manufacturing technology
4. Properties of Composites
5. Elastic properties, failure properties, and chemical properties
5. Behavior of composites under internal and external actions

assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references: (Si possible):

J. M. Berthelot "Matériaux composites" Ed. Lavoisier, 2005.
N. Bahlouli " Les matériaux composites"
http://www-ipst.u-strasbg.fr/nadia/courcomp/comp1.htm
J. Molimard "mécanique des matériaux composites" version 2, Septembre 2004.
D. Guy "Matériaux composites"

Semester: 3
Course unit: FCU 2.1.1
Subject: Recycled materials
SHV: 45h00 (Course: 1h30, DW:1h30)
Credits: 4
Coefficient: 2

Teaching objectives:

Raise students' awareness of the importance of waste recycling in the context of environmental protection and sustainable development.

Recommended prior knowledge:

Materials of construction, Concrete technology, Innovative concretes.

Course content:

Waste Management

- Definition of waste
- Collection, transport, and storage
- Waste treatment
- Costs in waste management
- Environmental impact assessment
- Life Cycle and sustainable development
- By-products of industry and their valorization in civil engineering (blast furnace slags, steel mill slags, and fly ash)
- **Recycling**
  - Recycling: definition and challenges
  - Alternative materials: sources and management
  - Concrete recycling
  - Cement Industry recycling
  - Recycling in road construction
- **Environmental approach to Concrete production**
- **Waste Valorization**
  - Sewage sludge
  - Dredging/Excavation sludge
  - Rubber
  - Construction waste

assessment method:

Continuous assessment: 40% ; Exam: 60%.

Bibliographic references:

Semester: 3
Course unit: FCU 2.1.1
Subject: Prestressed concrete
SHV: 45h00 (Course: 1h30, 1h30 DW)
Credits: 4
Coefficient: 2

Teaching objectives:

Understand the general principle, the materials used, and the methods of prestressing. Calculate prestressing losses and design a concrete section, as well as the prestressing force in relation to normal stresses.

Recommended prior knowledge:

Knowledge of the strength of materials and reinforced concrete calculations.

Course content:

Chapter 1: General overview:

- General principle of prestressing
- Materials used in prestressing
- methods of prestressing

Chapter 2: Prestressing Losses:

- Instantaneous losses
- Delayed losses
- Construction losses
- Tensioning losses

Chapter 3: Calculation of Isostatic beams at serviceability limit state:

- Calculation section
- Load combination
- Verification class
- Justification of normal stresses
- Section dimensioning
- Dimensioning of the prestressing force
- Cable layout
- Longitudinal passive reinforcement
- Justification of tangential stresses

Chapter 4: Resistance of a Beam Section at Ultimate Limit State:

- Load combination and material behavior
- Calculation of moment of resistance
- Justification of tangential stresses

Chapter 5: Constructive provisions

assessment method:

Continuous assessment: 40% ; Exam: 60%.

Bibliographic references:

Georges Dreux, Coursepratique du béton précontraint, Règles BPEL 83, 1983.
LACROIX (R.) et FUENTES (A.). – Le projet de béton précontraint. Eyrolles (1975).
THONIER (H.). – Le béton précontraint aux états limites. Presses de l'ENPC (1985).
CHAUSSIN (R.), MAHUT (B.) et LEBLANC (J.-Y.). – Guide d'emploi du BPEL 83. SETRA (1985).
CALGARO (J.-A.) et VIRLOGEUX (M.). – Projet et construction des ponts. Analyse structurale des tabliers de ponts. Presses de l'ENPC (1989).

Semester: 3
Course unit: FCU 2.1.2
Subject: Materials Durability
SHV: 45h00 (Course: 3h00)
Credits: 4
Coefficient: 2

Teaching objectives:

Understanding the factors and aggressive environments, as well as the measures to be implemented to protect constructions from degradation.

Recommended prior knowledge:

Construction materials, Mineral binders, Concrete technology, Innovative materials, Mineral chemistry**.**

Course content:

Chapter 1: Aggressive agents and modes of action

- Classification of aggressive environments
- Modes of action of agents
- Elementary Mechanisms of Interaction between aggressive agents and concrete
- Porosity and cracking: factors affecting concrete durability

Chapter 2: Permeability and diffusion in concrete

- Transport modes of substances
- Water – pore environment interactions
- Permeability and diffusion in concrete: influencing parameters
- Influence of hydrate stability on concrete durability
- Hydrate stability in aggressive environments

Chapter 3: Concrete durability against aggressive agents

- Carbonation of concrete
- Concrete durability in acidic environments
- Concrete durability in sulfate environments
- Concrete attack by chlorides

Chapter 4: Concrete casting in hot and cold climates

Chapter 5: Steel durability

- Reinforcement corrosion
- Steel rupture by flow
- Steel rupture by cracking
- Steel fatigue
- Steel creep and relaxation

Chapter 6: Wood durability

- Insect damage
- Marine xylophages
- Fungal growth

assessment method:

Exam: 100%.

Bibliographic references:

Semester: 3
Course unit: FCU 2.1.2
Subject: Innovative concretes 2
SHV: 22h30 (Course: 1h30)
Credits: 2
Coefficient: 1

Teaching objectives:

Study and learn about the different types of innovative concretes that could be used for specific cases.

Recommended prior knowledge:

Materials of construction, Concrete technology, Innovative concretes 1

Course content:

Chapter 1: Mass concrete

Chapter 2: Pavement concretes

Chapter 3: Precast concrete

Chapter 4: Refractory concrete

Chapter 5: Shotcrete

Chapter 6: Pumped concrete

assessment method:

Exam: 100%.

Bibliographic references:

Semester: 3
Course unit: MCU 2.1
Subject: Finite elements
SHV: 45h00 (Course: 1h30, DW: 1h30)
Credits: 4
Coefficient: 2

Teaching objectives:

Familiarization with the Finite Element method (FEM). Master the basic principles of FEM. Be able to solve problems in structural calculations. Use the method in the linear domain. Learn programming and raise awareness of the proper use of finite element codes.

Recommended prior knowledge:

Elasticity and the material strength modules, numerical methods, and computing in the context of the BSc program.

Course content:

Chapter 1: Approximation methods

1. The weighted residuals method, collocation method, least squares method, Galerkin method.
2. Variational calculus, Euler-Lagrange equation, Ritz method, strong and weak formulations.
3. Applications: solving first and second-order ordinary differential equations.

Chapter 2: Principles of the Finite Element method (FEM)

1. Nodal approximation – shape functions.
2. Elemental strain energy.
3. Elemental work of volume and surface forces.
4. Virtual work principle and the principle of minimum potential energy.

Chapter 3: Beam and Spring Elements

1. Spring element, linear spring, spiral spring.
2. Local-global numbering, connectivity table, assembly of elementary matrices.
3. Beam element, governing equation, direct formulation of the element.
4. Elemental stiffness matrices for a 2D beam, treatment of distributed loads, simple, double, fixed, and inclined support conditions.
5. 3D spatial beam element.
6. Applications: spring systems, combined beam-spring systems, truss systems, spatial truss.

Chapter 4: Beam Elements

1. Introduction and applications, general beam equation for plane structures.
2. 2-node plane beam element (Bernoulli beam), elemental stiffness matrix and load vector.
3. Generalized plane beam stiffness matrix (bending, tension, and compression), transformation of stiffness matrix and load vector, calculation of reactions and stresses, treatment of distributed loads, equivalent loads, temperature effect, support settlement effects.
4. Timoshenko beam, universal beam.
5. 3D beam element.
6. Applications: continuous beam, 2D and 3D portal frames.

Chapter 5: Isoparametric Elements

1. General introduction, meshing problem.
2. Geometrical transformation.
3. Element families: C0 family, C1 family.
4. Elementary characteristics.
5. Numerical integration, Gauss integration.

assessment method:

Continuous assessment: 40% ; Exam: 60%.

Bibliographic references:

1. The finite element method, Zienckiewicz O.C. and R.L. Taylor., Mc Graw Hill, 1989. 4th edition, 2 volumes.
2. Finite Element Procedures, Bathe K.J., Prentice Hall, 1996.
3. An Introduction to the Finite Element method, Reddy, J.N., McGraw Hill, 2005, 3rd edition.
4. Une présentation de la méthode des éléments finis, Dhatt G. et Touzot G., Maloine, 1981.
5. Finite Element method, Dhatt G., Touzot G., and Lefrançois E., Wiley, 2012.
6. Modélisation par éléments finis: Courseet exercices corrigés, Jean-Charles Craveur, Dunod, 2008 (3e édition).
7. Méthode des éléments finis, Approche pratique en mécanique des structures, Cazenave M., Dunod, 2010.
8. MATLAB Codes for Finite Element Analysis Solids and Structures, Ferreira A.J.M., Springer 2009.
9. The finite element method using Matlab, Young W.K. and Hyochoong B., CRC Press, 1997.
10. The Finite Element method, A Practical Course, Liu G.R. and Quek S.S., Butterworth-Heinemann, 2003.

Semester: 3
Course unit: MCU 2.1
Subject: PW Durability of materials
SHV: 22h30 (PW: 2h30)
Credits: 2
Coefficient: 1

Teaching objectives:

Understanding the degradation phenomena of materials and familiarizing with durability testing.

Recommended prior knowledge:

Materials of construction, Concrete technology, Innovative concretes

Course content:

PW 1: Absorption by immersion and capillarity
PW 2: Permeability of concrete
PW 3: Porosity
PW 4: Sulfate attack on concrete
PW 5: Acid attack on concrete
PW 6: Attack by chloride ions

assessment method:

Continuous assessment: 100%

Bibliographic references:

Semester: 3
Course unit: MCU 2.1
Subject: PW Innovative concretes
SHV: 22h30 (PW: 1h30)
Credits: 3
Coefficient: 2

Teaching objectives:

The formulation of innovative concrete and understanding the influencing factors in the implementation of these concretes. Becoming familiar with innovative concretes.

Recommended prior knowledge:

Materials of construction, Concrete technology, Innovative concretes

Course content:

PW 1: High-performance concrete

PW 2: Self-compacting concrete

PW 3: Fiber-reinforced concrete

PW 4: Reactive powder concrete

PW 5: Lightweight concrete

PW 6: Heavyweight concrete

PW 7: Concrete with recycled aggregates

assessment method:

Continuous assessment:100%

Bibliographic references:

Semester: 3
Course unit: TCU 2.1
Subject 1: Literature review and thesis design
SHV: 22h30 (Course: 1h30)
Credits: 1
Coefficient: 1

Teaching objectives:
This approach emphasizes providing students with the necessary tools to efficiently search for and utilize information for their final projects. It focuses on guiding them through the process of writing scientific documents, stressing the importance of effective communication, and teaching them how to present their work clearly and pedagogically. Let me know if you need further details or suggestions on how to implement this in your teaching!

Recommended prior knowledge:
Writing methodology, Presentation methodology.

Course content:
Part I: Documentary research
Chapter I-1: Defining the topic **(2 Weeks)**
Title of the topic
List of keywords related to the topic
Gather basic information (acquisition of specialized vocabulary, meaning of terms, linguistic definitions)
Information to be sought
Review existing knowledge in the field
Chapter I-2: Selecting information sources **(2 Weeks)**
Type of documents (books, theses, dissertations, journal articles, conference proceedings, audiovisual documents, etc.)
Types of resources (libraries, internet, etc.)
Evaluate the quality and relevance of information sources
Chapter I-3: Locating documents (1 Week)
Search techniques
Search operators
Chapter I-4: Processing information **(2 Weeks)**
Organization of work
Research questions
Synthesis of selected documents
Links between different sections
Final document research outline
Chapter I-5: Presentation of the bibliography **(1 Week)**
Citation styles (Harvard system, Vancouver system, Mixed system, etc.)
Presentation of documents
Citation of sources
Part II: Thesis development
Chapter II-1: Plan and stages of the thesis **(2 Weeks)**
Define and delimit the topic (summary)
Problem statement and thesis objectives
Other useful sections (acknowledgments, list of abbreviations, etc.)
Introduction (write the introduction last)
Review of specialized literature

Formulation of hypotheses
methodology
Results
Discussion
Recommendations
Conclusion and perspectives
List of subjects
Bibliography
Appendices

Chapter II-2: Writing techniques and standards (2 Weeks)

Formatting: Numbering of chapters, figures, and tables
Title page
Typography and punctuation
Writing: Scientific language (style, grammar, syntax)
Spelling: Improve general language competence in comprehension and expression
Save, secure, and archive data

Chapter II-3: Workshop: critical review of a manuscript (1 Week)

Chapter II-4: Oral presentations and defense (1 Week)

How to present a poster
How to present an oral communication
Thesis defense

Chapter II-5: How to avoid plagiarism? (1 Week)

(Formulas, sentences, illustrations, graphics, data, statistics, etc.)
Citation
Paraphrasing
Indicating full bibliographic reference

assessment method:

Exam: 100%

Bibliographic references:

1. M. Griselin et al., Guide de la communication écrite, 2e édition, Dunod, 1999.
2. J.L. Lebrun, Guide pratique de rédaction scientifique: comment écrire pour le lecteur scientifique international, Les Ulis, EDP Sciences, 2007.
3. A. Mallender Tanner, ABC de la rédaction technique: modes d'emploi, notices d'utilisation, aides en ligne, Dunod, 2002.
4. M. Greuter, Bien rédiger son mémoire ou son rapport de stage, L'Etudiant, 2007.
5. M. Boeglin, lire et rédiger à la fac. Du chaos des idées au texte structuré. L'Etudiant, 2005.
6. M. Beaud, l'art de la thèse, Editions Casbah, 1999.
7. M. Beaud, l'art de la thèse, La découverte, 2003.
8. M. Kalika, Le mémoire de Master, Dunod, 2005.

Detailed programs by subject for some discovery course units (S1, S2, S3)

Semester:
Course unit: DCU
Subject: Rheology of Materials
SHV: 22h30 (Course: 1h30)
Credits: 1
Coefficient: 1

Teaching objectives:

Understand the behavior law of concrete in the fresh and hardened states.

Recommended prior knowledge:

Construction materials course offered in the BSc program, including Strength of Materials, binders, and concrete.

Course content:

- Definition of rheology
- Basic Fluid mechanics recap (simple fluids, viscometric flows, viscoelastic fluids)
- Experimental rheology concepts (spring, friction pad, piston)
- Shear Flow (model assumptions)
- Viscosities (dynamic viscosity, kinematic viscosity, influence of thermodynamic properties on viscosity)
- Different rheological behaviors (newtonian fluids and non-newtonian fluids (non-linear) and thixotropy)
- Rheology of fresh concrete
- Rheology of hardened concrete (behavior laws: tension, bending, torsion, creep, and relaxation)
- Rheology of granular materials (interactions between grains, flow situations (free surface or confined), blockage mechanisms: movement correlations, role of walls)
- Rheology of polymers
- Measurement methods and instruments: viscometers and rheometers

assessment method:

Exam: 100 %.

Bibliographic references:

G.C COUARRAZE et J.L GROSSIORD, Initiation à la rhéologie, édition TECH.DOC
J - M TORRENTI, Du béton frais au béton durci - Éléments de comportement, techniques de l'ingénieur.
J- M GEOFFRAY Béton hydraulique – Mise en œuvre - Rhéologie et maturité des bétons, techniques de l'ingénieur.

Semester:
Course unit: DCU
Subject: Hydration and structuring of cement pastes
SHV: 22h30 (Course: 1h30)
Credits: 1
Coefficient: 1

Teaching objectives:

Understand and explain the mechanisms of formation and structuring of hydrates, as well as the origin of the mechanical strength of cements and concretes.

Recommended prior knowledge:

Mineral binders, inorganic chemistry, physical chemistry.

Course content:

Chapter 1 - Formation of clinker minerals
Chapter 2 - Structure of materials
Chapter 3 - Hydraulicity and hydration theories
Chapter 4 - Origin of mechanical strength
Chapter 5 - Phenomena accompanying hydration

assessment method:

Exam: 100 %.

Bibliographic references:

Semester:
Course unit: DCU
Subject: Design of experiments
SHV: 22h30 (Course: 1h30)
Credits: 1
Coefficient: 1

Teaching objectives:

Recommended prior knowledge:

Course content:
Chapter 1: Principle of the method

Chapter 2: Full factorial designs at two levels

Chapter 3: Fractional factorial designs at two levels

Chapter 4: Experimental errors

Chapter 5: Other two-level designs

Chapter 6: Second-degree designs

Chapter 7: Analysis of variance

Chapter 8: Mixture designs

Chapter 9: Software (practice)

assessment method:
Exam: 100%.

Bibliographic references:

Semester:
Course unit: DCU
Subject: Construction pathology
SHV: 22h30 (Course: 1h30)
Credits: 2
Coefficient: 1

Teaching objectives:
Understand construction pathologies in order to carry out effective repairs.

Recommended prior knowledge:
MDC, mineral binders, concrete technology.

Course content:

Chapter 1: Evaluation and diagnosis of concrete structures

Chapter 2: Main construction pathologies

Chapter 3: Inspection methods for structures

Chapter 4: Main repair materials

Chapter 5: Main repair techniques

Chapter 6: Strengthening of structures

Chapter 7: Monitoring and maintenance of structures

assessment method:
Exam: 100%.

Bibliographic references:

Semester:
Course unit: DCU
Subject: Construction site organization and management
SHV: 22h30 (Course: 1h30)
Credits: 2
Coefficient: 1

Teaching objectives:

The student must know the methods of internal site organization, site setup, site management, and commissioning.

Recommended prior knowledge:

Course content:

CHAPTER I: Internal organization of construction sites

CHAPTER II: Site setup

CHAPTER III: Site management

CHAPTER IV: Commissioning

CHAPTER V: Organizational methods

CHAPTER VI: Work planning tools

assessment method:

Exam: 100%.

Bibliographic references:

C.CHARTON, Organisation et gestion des entreprises de bâtiment et de travaux publics. Eyrolles
E.OLIVIER, Organisation technique des chantiers. Tome I. E.M.E.
E.OLIVIER, Organisation technique des chantiers. Tome II. E.M.E.
E.OLIVIER, Organisation technique des chantiers. Tome I., E.M.E.
J-P.BOUSQUET, La planification potentielle et son application au bâtiment. Eyrolles