

Agreement of Cooperation for the Granting of Dual Degrees – UNIBO and ULg

ANNEX B TO THE AGREEMENT OF COOPERATION FOR THE GRANTING OF DUAL DEGREES

8894 -Environmental engineering - Course schedule for outbound ULg students

1st YEAR

ULg	ECTS	UNIBO	ECTS	TAF
Groundwater quality and protection	3			
Groundwater modelling	5	Advanced Hydrosystems Engineering – ICAR/02	9	B
Determinative mineralogy	3	Petroleum Geosystems M – ING-IND/30	6	B
Rocks and sedimentary processes	3			
Numerical methods in Civil and Geological Engineering, Linear methods	4	Introduction to Numerical Methods – MAT/08	6	C
Geostatistics	5			
Rock mechanics, tunnels, rock slopes, rock foundations	5	Geotechnics And Geology - Geotechnical Engineering M – ICAR/07	6	B
Exploiting deposits, quarries and mines	2			
Tectonics	3	Geotechnics And Geology - Engineering Geology M – GEO/05	6	B
Geology of Wallonia	3			
Analytical chemistry	5	Biotechnology For The Sustainable Reclamation Of Contaminated Lands And Waters M – CHIM/11	6	C
Geological mapping	5	Industrial Ecology M - ING-IND/25	9	B
Solid waste processing	3			
Applied geophysics	5	Laboratory of Environmental Engineering	3	F
Building materials	3	Laboratory On Alternative And Renewable Raw Materials	3	F
Site investigation	3	Environmental Engineering Research A	6	E
	60		60	

2nd YEAR

ULg	ECTS	UNIBO	ECTS	TAF
Modelling and inversion in geophysics	3			
Recycling of waste and industrial by production systems	3	Resources And Recycling - ING-IND/29	6	B

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Natural Risk	3			
Environmental geotechnics	3			
one of two between: Process mineralogy Remediation of Contaminated Sites	4	Minerals Production Systems M – ING-IND/28	6	B
Remote sensing and geological imaging	5	Applied Geomatics – ICAR/06	6	B
Environmental aspects of industrial and mining activities	4			
One of two between: Introduction to free surface flows Origin and production for Hydrocarbons	2	Industrial Safety M – ING-IND/25	6	B
External placement	5	Water engineering – I.C. - Flood and drought risk management - ICAR/02 Groundwater and contamination processes - ICAR/01	12	B
Environmental geotechnics	3			
Integrated project in geological Engineering	5			
Management for Engineering	4	Elective Courses*	6	D
Final Thesis	20	Environmental Engineering Research A +B (Thesis)	18	E
	60		60	

Elective Courses @ UNIBO	ECTS	TAF
Geotechnical Engineering - ICAR/07	6	B
Industrial Ecology - ING-IND/25	9	B
Context-Sensitive Design in Transportation Infrastructures - ICAR/04	6	D
Material Characterization and Laboratory - ING-IND/22	6	D
Sustainability in Construction - ICAR/09	6	D
Photocatalytic processes and Environmental Applications - ING- IND/24	3	
Laboratory on Alternative and renewable raw materials	3	F
Laboratory of Environmental Engineering	3	F

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Environmental engineering – Course schedule for outbound UNIBO students

1st YEAR

UNIBO	ECTS	TAF	Ulg	ECTS
			Groundwater quality and protection	3
Advanced Hydrosystems Engineering – ICAR/02	9	B	Groundwater modelling	5
Petroleum Geosystems – ING-IND/30	6	B	Determinative mineralogy	3
			Rocks and sedimentary processes	3
Introduction to Numerical Methods – MAT/08	6	C	Numerical methods in Civil and Geological Engineering, Linear methods	4
			Geostatistics	5
Geotechnics And Geology – Geotechnical Engineering M – ICAR/07	6	B	Rock mechanics, tunnels, rock slopes, rock foundations	5
			Exploiting deposits, quarries and mines	2
Geotechnics And Geology – Engineering Geology M – GEO/05	6	B	Tectonics	3
			Geology of Wallonia	3
Biotechnology For The Sustainable Reclamation Of Contaminated Lands And Waters M – CHIM/11	6	C	Analytical chemistry	5
Industrial Ecology M – ING-IND/25	9	B	Geological mapping	5
			Solid waste processing	3
Laboratory of Environmental Engineering	3	F	Applied geophysics	5
Laboratory On Alternative And Renewable Raw Materials	3	F	Building materials	3
Environmental Engineering Research A	6	E	Site investigation	3
				60

2nd YEAR

UNIBO	ECTS	TAF	ULg	ECTS
Resources And Recycling - ING-IND/29	6	B	Solid waste and by-product processing	5
Minerals Production Systems - ING-IND/28	6	B	Process mineralogy	5
Applied Geomatics ICAR/06	6	B	Geological mapping	5
Industrial Safety ING-IND/25	6	B	Environmental impact of Industrial and Mining activities	5

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Water engineering – I.C. - Flood and drought risk management - ICAR/02	6	B	Geothermy	5
Water engineering – I.C. - Groundwater and contamination processes - ICAR/01	6	B	Choose one of the two: 1) Geohazard assessment and geomorphology OR 2) Exploitation of mineral deposits	5
Elective Courses	12	D	Elective Courses	10
Environmental Engineering Research B (Thesis)	12	E	Final Thesis	20
	60			60

Elective Courses @ ULg	ECTS
Geological imaging and inverse modelling	5
Geostatistics	5
Analytic mineralogy	5
Groundwater modelling	5
Site investigation	5
Groundwater quality and protection	5
Site remediation	5
Internship	5

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8895 - Civil Engineering - Course schedule for outbound ULg students

1° YEAR

ULg	ECTS	UNIBO	ECTS	TAF
Hydrodynamique fluviale (5) Ecoulements à surface libre (5) Conception et exécution des écluses et barrages fixes (5)	15	Advanced hydrosystems engineering – ICAR/02	9	B
Analyse des structures I (5) Analyse des structures II (5)	10	Advanced structural mechanics - ICAR/08	9	B
Méthodes numériques	5	Numerical methods –MAT/08	12	C
Structures en béton (5) Structures métalliques et mixtes (5) Conception et exécution des bâtiments(5)	15	Advanced design of structures-ICAR/09	9	B
Mécanique des sols et des roches (5) Conception et exécution des ouvrages géotechniques (5)	10	Geotechnical engineering-ICAR/07	6	B
		Infrastructure systems-ICAR/05	9	B
Sélection des matériaux	5	Science and technology of composite materials	6	D
	60		60	

2° YEAR

Compulsory courses:

ULg	ECTS	UNIBO	ECTS	TAF
Conception et execution des infrastructures routières (3)	3	Geotechnical engineering – ICAR/07	6	B
Management	5	Managing engineering and construction processes - ING-IND/35	6	C
Master Thesis	25	Civil engineering research A (6)+B (12)	18	E
	33		30	

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Elective courses: choose 18 CREDITS AMONG ONE ONLY OF THE FOLLOWING GROUPS (STRUCTURAL ENGINEERING OR INFRASTRUCTURE DESIGN IN RIVER BASINS):

**18 CREDITS (3 SUBJECTS) GROUP
STRUCTURAL ENGINEERING
TAF B**

ULg	ECTS	UNIBO	ECTS	TAF
	3	Mechanics of historical masonry structures – ICAR/08	6	B
Flood risk management (3) Environmental impacts of constructions (3)	6	Structural safety- ICAR/09	6	B
Nonlinear finite elements	3	Computational mechanics – ICAR/08	6	B
Seismic design (3)	3	Earthquake engineering – ICAR/09	6	B
Maintenance and repair of existing structures (3)	3	Struct. Strengthening & rehabilitation – ICAR/09	6	B
		Design of large sc. Struct- ICAR/09	6	B
			18 / 36	

**18 CREDITS (3 SUBJECTS) GROUP
INFRASTRUCTURES DESIGN IN RIVER BASINS
TAF B**

ULg	ECTS	UNIBO	ECTS	TAF
Topographie : instruments et méthodes (GEOG0232-4)	6	Applied geomatics- ICAR/06	6	B
Transport et mobilité urbaine	6	Context-sensitive design in transportation infrastructures- ICAR/04	6	B
Hydrogéologie appliquée (4) Risques hydrologiques : inondations, flux boueux et surexploitation des nappes aquifères (3)	7	Sustainable design of water resources systems ICAR/02	6	B
		Engineering geology- GEO/05	6	D
GEOL0083-3 Groundwater modelling	5	Water engineering – I.C. - Groundwater and contamination processes - ICAR/01	6	B
Risques hydrologiques : inondations, flux boueux et surexploitation des nappes aquifères (3) Risques naturels en milieu côtier : érosion littorale, protection des installations portuaires, subsidence naturelle ou induite, intrusion des eaux salées, impact du changement climatique, tsunami (3)	6	Water engineering – I.C. - Flood and drought risk management – ICAR/02	6	B
			18 / 36	

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Elective subjects in Bologna (12 ECTS) – TAF D

ULg	ECTS	UNIBO	ECTS
Choix et optimisation des matériaux	5	Science and technology of composite materials ING-IND/22	6
Remediation of contaminated sites	4	Biotechnology for the sustainable reclamation of contaminated lands and waters ICAR/03	6
Impacts environnementaux des constructions	3	Sustainability in construction (SASICE) ICAR/09	6
			12 / 18

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Civil Engineering - Course schedule for outbound UNIBO students

1° YEAR

UNIBO	TAF	ECTS	ULg	ECTS
Advanced hydrosystems engineering ICAR/02	B	9	Hydrodynamique fluviale (5) Ecoulements à surface libre (5) Conception et exécution des écluses et barrages fixes (5)	15
Advanced structural mechanics ICAR/08	B	9	Analyse des structures II	5
Numerical methods MAT/08	C	12	Methodes numériques (4)	4
Advanced design of structures ICAR/09	B	9	Constructions en béton (5) Constructions métalliques et mixtes (5) Timber structures (3) Conception et exécution des bâtiments (5)	18
Geotechnical engineering ICAR/07	B	6	Mecanique des sols et des roches	5
Civil engineering research A	E	6	Stage (master ii)	5
Infrastructure systems ICAR/05	B	9	Conception et exécution des structures et des ponts (3) (master ii) Fundamentals of transportation (3) (master ii)	6
		60		58

2° YEAR

Compulsory courses

UNIBO	ECTS	TAF	ULg	ECTS
Design projects	6	F	Projet intégré	7
Managing engineering and construction processes - ING-IND/35	6	C	Management	5
Civil engineering research A (TAF E) + 1 elective (6 ECTS)	18	E	Travail de fin d'études	25
			Conception et execution des ponts	3
			Conception et execution des réseaux hydrauliques et barrages mobiles	3
Context-sensitive design in transport. ICAR/04	6	D	Conception et exécution des infrastructures routières	3
	36			46

Elective courses: Choose 15 credits amongst:

Elective Courses @ ULg	ECTS
Voies navigables	3
Ouvrages geotechniques	5
Conception structurale	3
Tcb III	4
Gc accidentelles et except.	4
Batiments acc. Et except.	5

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		15/24
Elective Courses @ ULg		ECTS
Seismic Engineering		3
Ports & Waterways		3
Planning of construction works		3
Maintenance and repair of structures		3
Nonlinear finite elements		3
Flood Risk Management		3
Timber structures		3
Experimental geotechnics		3
Environmental impacts of constructions		3
Fire Engineering		3
Fundamentals of transportation		3
		15/33