

## CATALOGUE OF COURSE UNITS



This table lists all the modules offered in the IMACS Masters Course study programme and give the following informations :

- Code, Title, Teaching language(s) : EN, PT, FR ;
- Schedule and Coordination (i.e. when and where the course is delivered and who is coordinating its organisation) (**UP** : Université de Poitiers – **TUC** : Technical University of Crete – **UA** : Universidade de Aveiro – **UO** : University of Ottawa – **UFRGS** : Universidade Federal do Rio Grande do Sul) ;
- If the module is compulsory (C) or elective (E) ;
- Teaching volume and number of ECTS.

<b>UP - 000</b>	<b>Intensive course in French</b>	<b>UP</b>	<b>Elective</b>	<b>30h</b>	<b>ECTS : 0</b>
Contents		Evaluation		Horary	
Intensive training in French language using a variety of multimedia tools and open conversation in groups		written exam		lecture	
		oral exam		seminary	
		50% exercises		30 practice	
Teaching staff : CFLE-UP (Centre Français Langue Etrangère)		project			
		report		Teaching	
		presentation		FR <b>P0 Y1</b>	
<b>UP - 001</b>	<b>Field trip</b>	<b>UP</b>	<b>Compulsory</b>	<b>28h</b>	<b>ECTS : 3</b>
Contents		Evaluation		Horary	
Field trip		written exam		8 lecture	
		oral exam		seminary	
		50% exercises		20 practice	
Teaching staff : UP staff		project			
		100% report		Teaching	
		presentation		EN, FR <b>P0 Y1</b>	
<b>UP - 101</b>	<b>Language training in English, Portuguese or French</b>	<b>UP</b>	<b>Compulsory</b>	<b>40h</b>	<b>ECTS : 2</b>
Contents		Evaluation		Horary	
Weakly language training		written exam		lecture	
		50% oral exam		seminary	
		50% exercises		40 practice	
Teaching staff : UP - UFR Lettres et Langues, Centre de Langue Portugaise, Département d'Etude de la Langue Portugaise et Brésilienne, CFLE-UP (Centre Français Langue Etrangère)		project			
		report		Teaching	
		presentation		FR, PT, EN <b>P1 Y1</b>	
<b>UP - 102</b>	<b>Basic knowledge update</b>	<b>UP</b>	<b>Compulsory</b>	<b>28h</b>	<b>ECTS : 4</b>
Contents		Evaluation		Horary	
Basic knowledge update in Mathematics, Physics, Chemistry, Earth Sciences		50% written exam		28 lecture	
		oral exam		seminary	
		50% exercises		practice	
Teaching staff : UP		project			
		Report		Teaching	
		presentation		EN, FR <b>P1 Y1</b>	
<b>UP - 103</b>	<b>Crystal structure and organisation of finely divided solids</b>	<b>UP</b>	<b>Compulsory</b>	<b>56h</b>	<b>ECTS : 6</b>
Contents		Evaluation		Horary	
Crystal chemistry of phyllosilicates and other lamellar structures: basics. Physical principles of interactions between a particle beam and solids. Theoretical basis of diffractions (X-rays, electrons and neutrons) and common uses. Structural characterisation of lamellar structures. Practical : common uses of X-ray diffraction, practical specific to lamellar systems. Quantitative phase analyses using X-ray diffraction		50% written exam		28 lecture	
		oral exam		seminary	
		50% exercises		28 practice	
Teaching staff : E. Ferrage (UP), A. Meunier (UP) and external contributors: B. Lanson, R. Kleeberg		project			
		Report		Teaching	
		presentation		EN, FR <b>P1 Y1</b>	

<b>UP - 104</b>	<b>Crystal chemistry and local structure of clays</b>	<b>UP</b>	<b>Compulsory</b>	<b>56h</b>	<b>ECTS : 6</b>
<b>Contents</b>		<b>Evaluation</b>		<b>Horary</b>	
Vibrational spectroscopies (IR, Raman). EPR spectroscopies, transition elements, defect. NMR spectroscopy. X absorption spectroscopy, crystal chemistry of iron phases. Thermal analyses Examples of integrated studies <i>Teaching staff : S. Petit (UP) and external contributors</i>		50%	written exam	28	lecture
			oral exam		seminary
		50%	exercises	28	practice
			project		
			Report		<i>Teaching</i>
			presentation		<i>EN, FR</i> <b>P1 Y1</b>
<b>UP - 105</b>	<b>Crystal growth and mineralogenesis of clays</b>	<b>UP</b>	<b>Compulsory</b>	<b>56h</b>	<b>ECTS : 6</b>
<b>Contents</b>		<b>Evaluation</b>		<b>Horary</b>	
Fundamentals of crystal growth, equilibria and disequilibria in multicomponents systems : the equilibria shape of crystals ; growth kinetics ; free crystal growth ; collective behaviour of crystals. The case of clays : inferences for anisotropic crystals ; dissolution/recrystallisation, replacement in the solid state; order/disorder in the layer stacking Clay synthesis from solutions and from gels  <i>Teaching staff : S. Petit (UP) and external contributors : A Baronnet and others</i>		50%	written exam	26	lecture
			oral exam		seminary
		50%	exercises	30	practice
			project		
			Report		<i>Teaching</i>
			presentation		<i>EN, FR</i> <b>P1 Y1</b>
<b>UP - 106</b>	<b>Thermodynamic data for clay minerals</b>	<b>UP</b>	<b>Compulsory</b>	<b>28h</b>	<b>ECTS : 3</b>
<b>Contents</b>		<b>Evaluation</b>		<b>Horary</b>	
Fundamental principles, reference state mass-action expression, solubility, stability and aqueous species diagrams, thermodynamic database. Experimental measurements of thermodynamic constants; calorimetry and aqueous phase equilibrium. Methods of prediction applied to thermodynamic properties of clay minerals : enthalpy, Gibbs free energy, entropy and heat capacity  <i>Teaching staff : P. VIEILLARD (UP) and external contributors: P. Blanc and others</i>		50%	written exam	20	lecture
			oral exam		seminary
		50%	exercises	8	practice
			project		
			Report		<i>Teaching</i>
			presentation		<i>EN, FR</i> <b>P1 Y1</b>
<b>UP - 107</b>	<b>Molecular modelling</b>	<b>UP</b>	<b>Compulsory</b>	<b>28h</b>	<b>ECTS : 3</b>
<b>Contents</b>		<b>Evaluation</b>		<b>Horary</b>	
General interest and importance of molecular modelling for the study of matter. Basic principles of statistical mechanics Levels of modelling (ab-initio, classical atomic, mesoscopic). Details on Monte Carlo and Molecular Dynamics Simulation of type MC and MD for the study of clays joining simulation and experiment  <i>Teaching staff : external contributors : V. Marry and others</i>		50%	written exam	14	lecture
			oral exam	6	seminary
			exercises	8	practice
		50%	project		
			Report		<i>Teaching</i>
			presentation		<i>EN, FR</i> <b>P1 Y1</b>
<b>UP - 108</b>	<b>Physical chemistry and hydromechanics : Microstructure and physical properties</b>	<b>UP</b>	<b>Compulsory</b>	<b>56h</b>	<b>ECTS : 6</b>
<b>Contents</b>		<b>Evaluation</b>		<b>Horary</b>	
Introduction to the microstructure of clay: particles, aggregates and porosity. Observation and quantitative analyses (microscopy, mapping and quantitative analyses). Textural analyses : gaz adsorption and mercury porosimetry. Microstructure and hydromechanical properties : swelling, homogenisation  <i>Teaching staff : D. Prêt (UP) + external contributors : F. Villieras and others</i>		50%	written exam	28	lecture
			oral exam		seminary
		50%	exercises	28	practice
			project		
			Report		<i>Teaching</i>
			presentation		<i>EN, FR</i> <b>P1 Y1</b>

<b>UP - 109</b>	<b>Physical chemistry and hydromechanics : Solid-solution interface</b>	<b>UP</b>	<b>Compulsory</b>	<b>56h</b>	<b>ECTS : 6</b>
Contents	Evaluation	Horary			
Introduction to colloid chemistry, size, shape, surface, surface, energy. Adsorption processes : electrical charge, ionic exchange, complexation, adsorption of organic molecules. Hydration : crystalline and osmotic swellings. Colloidal behaviour : aggregation, rheology	50%	written exam	28	lecture	
		oral exam		seminary	
	50%	exercises	28	practice	
		project			
<i>Teaching staff : E. Tertre (UP) + external contributors : F. Thomas and others</i>		Report	<i>Teaching</i>		
		presentation	EN, FR	<b>P1 Y1</b>	
<b>UP - 110</b>	<b>Bibliographical project</b>	<b>UP</b>	<b>Compulsory</b>	<b>20h</b>	<b>ECTS : 3</b>
Contents	Evaluation	Horary			
Bibliographical research work on a subject dealing with clay chosen by the student		written exam		lecture	
		oral exam		seminary	
		exercises	20	practice	
		project			
<i>Teaching staff : UP</i>	100%	Report	<i>Teaching</i>		
		presentation	EN, FR	<b>P1 Y1</b>	
<b>TUC - 200</b>	<b>Language training in Greek</b>	<b>TUC</b>	<b>Elective</b>	<b>30h</b>	<b>ECTS : 0</b>
Contents	Evaluation	Horary			
Weakly language training		written exam		lecture	
		oral exam		seminary	
	100%	exercises	30	practice	
		project			
<i>Teaching staff : External contributor</i>		report	<i>Teaching</i>		
		presentation	GR	<b>P2 Y1</b>	
<b>TUC - 201</b>	<b>Professional practice and research project</b>	<b>TUC</b>	<b>Compulsory</b>	<b>400h</b>	<b>ECTS : 12</b>
Contents	Evaluation	Horary			
This module offers the possibility to the student to deal with a specific applied domain in a given time period. The objective is to provide the student with a professional experience and to give him the opportunity of getting integrated into a professional team.		written exam		lecture	
		oral exam		seminary	
		exercises	400	practice	
		project			
<i>Teaching staff : TUC</i>	75%	Report	<i>Teaching</i>		
	25%	presentation		<b>P2 Y1</b>	
<b>UA - 210</b>	<b>Language training in Portuguese</b>	<b>UA</b>	<b>Elective</b>	<b>60h</b>	<b>ECTS : 0</b>
Contents	Evaluation	Horary			
Weakly language training		written exam		lecture	
		oral exam		seminary	
	100%	exercises	60	practice	
		project			
<i>Teaching staff :</i>		report	<i>Teaching</i>		
		presentation	PT	<b>P2 Y1</b>	
<b>UA - 211</b>	<b>Professional practice and research project</b>	<b>UA</b>	<b>Compulsory</b>	<b>400h</b>	<b>ECTS : 12</b>
Contents	Evaluation	Horary			
This module offers the possibility to the student to deal with a specific applied domain in a given time period. The objective is to provide the student with a professional experience and to give him the opportunity of getting integrated into a professional team.		written exam		lecture	
		oral exam		seminary	
		exercises	400	practice	
		project			
<i>Teaching staff : UA</i>	75%	Report	<i>Teaching</i>		
	25%	presentation		<b>P2 Y1</b>	

UFRGS - 220 Language training in Portuguese		UFRGS	Elective	30h	ECTS : 0
Contents	Evaluation	Horary			
Weakly language training		written exam		lecture	
		oral exam		seminary	
	100%	exercises	30	practice	
		project			
Teaching staff :		report		Teaching	
		presentation		PT	P2 Y1
UFRGS - 221 Professional practice and research project		UFRGS	Compulsory	400h	ECTS : 12
Contents	Evaluation	Horary			
This module offers the possibility to the student to deal with a specific applied domain in a given time period. The objective is to provide the student with a professional experience and to give him the opportunity of getting integrated into a professional team.		written exam		lecture	
		oral exam		seminary	
		exercises	400	practice	
		project			
	75%	Report		Teaching	
Teaching staff : UFRGS	25%	presentation			P2 Y1
UO - 230 Language training in French or English		UO	Elective	56h	ECTS : 0
Contents	Evaluation	Horary			
Weakly language training		written exam		lecture	
	50%	oral exam		seminary	
	50%	exercises	56	practice	
		project			
Teaching staff :		report		Teaching	
		presentation		FR, EN	P2 Y1
UO - 231 Professional practice and research project		UO	Compulsory	400h	ECTS : 12
Contents	Evaluation	Horary			
This module offers the possibility to the student to deal with a specific applied domain in a given time period. The objective is to provide the student with a professional experience and to give him the opportunity of getting integrated into a professional team.		written exam		lecture	
		oral exam		seminary	
		exercises	400	practice	
		project			
	75%	Report		Teaching	
Teaching staff : UFRGS	25%	presentation			P2 Y1
TUC - 300 Language training in Greek		TUC	Elective	30h	ECTS : 0
Contents	Evaluation	Horary			
Weakly language training		written exam		lecture	
		oral exam		seminary	
	100%	exercises	30	practice	
		project			
Teaching staff : External contributor		report		Teaching	
		presentation		GR	P3 Y2
TUC - 301 Industrial clay deposits		TUC	Compulsory	56h	ECTS : 6
Contents	Evaluation	Horary			
Bentonites, kaolins, palygorskite and sepiolite, common clays. Geological characteristics of industrial clay deposits. Important physical properties of industrial clays (cation exchange capacity, plasticity, viscosity, colour, specific surface area, porosity, particle size distribution). Techniques for characterisation of industrial clays (mineralogy, chemistry, physical and chemical properties, thermal techniques). Assessment routes of industrial clay deposits.	50%	written exam	24	lecture	
		oral exam	8	seminary	
	25%	exercises	24	practice	
	25%	project			
		Report		Teaching	
		presentation		EN	P3 Y2
Teaching staff : external contributors : G.E. Christidis (TUC), P. Makri (TUC) + external collaborators					

<b>TUC - 302</b>	<b>Clays for geotechnical and civil engineering applications</b>	<b>TUC</b>	<b>Compulsory</b>	<b>42h</b>	<b>ECTS : 4.5</b>
Contents	Evaluation	Horary			
Classification of soils, grain size analysis, swelling of clays, hydraulic conductivity of clays, plasticity of clays, consolidation tests, unconfined compression testing, direct shear tests.	50%	written exam	16	lecture	
		oral exam	8	seminary	
	25%	exercises	18	practice	
	25%	project			
		Report	Teaching		
Teaching staff :E. Steiakakis (TUC) + external collaborators	presentation		EN	P3 Y2	
<b>TUC - 303</b>	<b>Processing routes for layer silicates and associated minerals</b>	<b>TUC</b>	<b>Compulsory</b>	<b>42h</b>	<b>ECTS : 4.5</b>
Contents	Evaluation	Horary			
Processing of layer silicates and associated minerals (classification, froth flotation, magnetic separation, electrostatic separation, density separation), removal of clay gangue from mineral deposits, mass balance and evaluation of beneficiation routes for industrial clays, process design and simulation.	50%	written exam	16	lecture	
		oral exam	8	seminary	
	25%	exercises	18	practice	
	25%	project			
		Report	Teaching		
Teaching staff :E. Stamboliadis (TUC) + E. Petrakis (TUC) + O. Pantelaki (TUC) + external collaborators	presentation		EN	P3 Y2	
<b>TUC - 304</b>	<b>Field trip to industrial clay deposits (4 days)</b>	<b>TUC</b>	<b>Elective</b>	<b>28h</b>	<b>ECTS : 3</b>
Contents	Evaluation	Horary			
Visit to industrial clay deposits in Milos Island (bentonites, kaolins and zeolites) or in Grevena area (palygorskite-smectite)		written exam		lecture	
		oral exam		seminary	
	100%	exercises	28	practice	
		project			
		report	Teaching		
Teaching staff : G.E. Christidis (TUC)+ E. Stamboliadis (TUC) + external collaborators from industry	presentation		EN	P3 Y2	
<b>UO - 310</b>	<b>Language training in French or English</b>	<b>UO</b>	<b>Elective</b>	<b>56h</b>	<b>ECTS : 0</b>
Contents	Evaluation	Horary			
Weakly language training		written exam		lecture	
	50%	oral exam		seminary	
	50%	exercises	56	practice	
		project			
		report	Teaching		
Teaching staff :	presentation		EN, FR	P3 Y2	
<b>UO - 311</b>	<b>Seminar</b>	<b>UO</b>	<b>Elective</b>	<b>28h</b>	<b>ECTS : 3</b>
Contents	Evaluation	Horary			
Presentation of a seminar and attending a series of seminars. Techniques and skills of scientific presentations		written exam		lecture	
		oral exam	14	seminary	
		exercises	14	practice	
		project			
		report	Teaching		
Teaching staff : Department of Chemistry (Ottawa)	100% presentation		EN, FR	P3 Y2	
<b>UO - 312</b>	<b>Clay minerals chemistry</b>	<b>UO</b>	<b>Elective</b>	<b>56h</b>	<b>ECTS : 6</b>
Contents	Evaluation	Horary			
Mineralogy and structure of clay minerals. Hybrid clay materials, advanced clay for catalysis applications, Inorganic structure-clay nanocomposites, polymer-clay and polymer-HDL nanocomposites, new trends in research of advanced clay materials	60%	written exam	20	lecture	
		oral exam	10	seminary	
	15%	exercises	26	practice	
		project			
		report	Teaching		
Teaching staff : C. Detellier (UO; Chemistry); A. Lalonde (UO, Earth Science) + external contributors	25% presentation		EN, FR	P3 Y2	

<b>UO - 313</b>	<b>Surface chemistry of clay minerals</b>	<b>UO</b>	<b>Elective</b>	<b>56h</b>	<b>ECTS : 6</b>
Contents	Evaluation	Horary			
Characterization techniques of clay minerals and clay-based advanced materials, with hands-on applications, including electron microscopy (SEM, HRTEM); XPS; Microporosimetry; TG-MS; FTIR; Solid-State NMR		written exam		lecture	
		oral exam		seminary	
	100%	exercises	56	practice	
		project			
<i>Teaching staff : C. Detellier(UO); Y. Liu; S. Mommers; S. Letaief (Center for Research and Innovation in Catalysis; UO)</i>		report		<i>Teaching</i>	
		presentation	EN, FR	<b>P3 Y2</b>	
<b>UO - 314</b>	<b>Surface chemistry of clay minerals</b>	<b>UO</b>	<b>Elective</b>	<b>28</b>	<b>ECTS : 3</b>
Contents	Evaluation	Horary			
Basic computational and simulation methods. Particular emphasis on solid state calculation and extended solid structures, such as clay minerals	75%	written exam	14	lecture	
		oral exam		seminary	
	25%	exercises	14	practice	
		project			
<i>Teaching staff : S. Gorelski (UO)</i>		report		<i>Teaching</i>	
		presentation	EN, FR	<b>P3 Y2</b>	
<b>UP - 401</b>	<b>Geological systems : clays in the Earth's crust</b>	<b>UP</b>	<b>Elective</b>	<b>56h</b>	<b>ECTS : 6</b>
Contents	Evaluation	Horary			
Origin and evolution of clays in oceanic environment : detrital hydrothermal and authigenic clays. Continental clays : weathering in tropical zones, clays in fossil hydrothermal systems and active geothermal fields, evolution of clays during diagenesis of silicoclastic sediments	50%	written exam	28	lecture	
		oral exam		seminary	
		exercises	28	practice	
		project			
<i>Teaching staff : D. Beaufort (UP) , P. Patrier (UP) + A. El Albani + external contributors</i>	50%	report		<i>Teaching</i>	
		presentation	EN, FR	<b>P4 Y2</b>	
<b>UP - 402</b>	<b>Fluid clays interaction modelling in the environment</b>	<b>UP</b>	<b>Elective</b>	<b>28h</b>	<b>ECTS : 3</b>
Contents	Evaluation	Horary			
Thermodynamic modelling of fluid-clays interactions. Kinetic modelling of the precipitation of clay minerals (1) with fixed composition, (2) with variable composition. From experiments to modelling on Al-Mg layer silicates	50%	written exam	14	lecture	
		oral exam		seminary	
		exercises	14	practice	
		project			
<i>Teaching staff : external contributors: B. Fritz...</i>	50%	report		<i>Teaching</i>	
		presentation	EN, FR	<b>P4 Y2</b>	
<b>UP - 403</b>	<b>The critical zone</b>	<b>UP</b>	<b>Elective</b>	<b>56h</b>	<b>ECTS : 6</b>
Contents	Evaluation	Horary			
Role of biota in clay genesis. Microorganism/clay interactions. Plant/clay interactions Oxido-reduction and lamellar structures. Speciation of metals in soil. Field investigations	50%	written exam	20	lecture	
		oral exam	8	seminary	
		exercises	28	practice	
		project			
<i>Teaching staff : L. Caner + external contributors</i>	50%	report		<i>Teaching</i>	
		presentation	EN, FR	<b>P4 Y2</b>	

UP - 404 Field trip		UP	Elective	28h	ECTS : 3				
Contents		Evaluation		Horary					
Visit of historical and famous regional clay sites (Montmorillon, Nontron...)		written exam		lecture					
		oral exam		seminary					
		exercises		28		practice			
		project							
		100%		report		<i>Teaching</i>			
<i>Teaching staff : A. Meunier, P. Patrier, A. El Albani (UP) + external contributors</i>		presentation		<i>EN, FR</i>		<b>P4 Y2</b>			
UA - 410 Language training in Portuguese		UA	Elective	36	ECTS : 0				
Contents		Evaluation		Horary					
Weakly language training		written exam		lecture					
		oral exam		seminary					
		100%		exercises		36		practice	
		project							
		report				<i>Teaching</i>			
<i>Teaching staff :</i>		presentation		<i>PT</i>		<b>P4 Y2</b>			
UA - 411 Interaction clays and biological systems		UA	Elective	56h	ECTS : 6				
Contents		Evaluation		Horary					
Mineralogical and environmental bases. Basics in physiology and cell biology-biochemistry. Basics in chemistry and biochemistry Bio-adhesivity; bio-activity, bacteriological studies, microflora characterization, and evaluation of anti-inflammatory action. Photosynthetic activity measured by Pulse Amplitude Modulated fluorometry. Detection of SGLs by HPTLC, quantified by Azure A colorimetric method and chemically characterized by MS Bacteria identification by DGGE.		50%		written exam		28		lecture	
				oral exam				seminary	
		50%		exercises		28		practice	
		project							
		Report						<i>Teaching</i>	
<i>Teaching staff : F. Rocha (UA) , E. Silva (UA) + external contributors</i>		presentation		<i>EN, PT</i>		<b>P4 Y2</b>			
UA - 412 Healing minerals : Identification and characterisation, advanced clay for health		UA	Elective	56h	ECTS : 6				
Contents		Evaluation		Horary					
Mineralogical composition (XRD, SEM) Chemical composition (XRF, AAS, SEM-EDAX) Grain size distribution by X-ray absorption (Sedigraph) Maturation. Certification and normalization. Quality control. Prototype maturation plant. Microalgae development during maturation and physiologic effect of thermal muds		50%		written exam		28		lecture	
				oral exam				seminary	
		50%		exercises		28		practice	
		project							
		Report						<i>Teaching</i>	
<i>Teaching staff : F. Rocha (UA) , E. Silva (UA) + external contributors</i>		presentation		<i>EN, PT</i>		<b>P4 Y2</b>			
UA - 413 Healing minerals : industrial aspects		UA	Elective	56h	ECTS : 6				
Contents		Evaluation		Horary					
Relevant clay technological properties: pH, specific surface area, ion exchange capacity and exchangeable ions, adsorption and absorption, liquid and plastic limits – plasticity index, expandability, adherence limit, abrasivity, cooling rate, specific heat, heat diffusiveness, soluble salts, water retention. Visit of healing clay sites (Meco, Consolação...)		25%		written exam		14		lecture	
				oral exam				seminary	
		25%		exercises		42		practice	
		project							
		50%		Report				<i>Teaching</i>	
<i>Teaching staff : F. Rocha (UA) , E. Silva (UA) + C. Patinha (UA) , P. Marinho (UA) + external contributors</i>		presentation		<i>EN, PT</i>		<b>P4 Y2</b>			

<b>UP - 501 Master Thesis</b>		<b>UP</b>	<b>Elective</b>	<b>600h</b>	<b>ECTS : 24</b>
Contents	Evaluation	Horary			
Each student should develop and present an original and innovative research project under the supervision (or co-supervision) of a staff member of the UP.		written exam		lecture	
		oral exam		seminary	
		exercises	600	practice	
		project			
	75%	report		<i>Teaching</i>	
Teaching staff :	25%	presentation		<b>P5 Y2</b>	
<b>TUC - 511 Master Thesis</b>		<b>TUC</b>	<b>Elective</b>	<b>600h</b>	<b>ECTS : 24</b>
Contents	Evaluation	Horary			
Each student should develop and present an original and innovative research project under the supervision (or co-supervision) of a staff member of the TUC.		written exam		lecture	
		oral exam		seminary	
		exercises	600	practice	
		project			
	75%	report		<i>Teaching</i>	
Teaching staff :	25%	presentation		<b>P5 Y2</b>	
<b>UA - 521 Master Thesis</b>		<b>UA</b>	<b>Elective</b>	<b>600h</b>	<b>ECTS : 24</b>
Contents	Evaluation	Horary			
Each student should develop and present an original and innovative research project under the supervision (or co-supervision) of a staff member of the UA.		written exam		lecture	
		oral exam		seminary	
		exercises	600	practice	
		project			
	75%	report		<i>Teaching</i>	
Teaching staff :	25%	presentation		<b>P5 Y2</b>	
<b>UFRGS - 530 Language training in Portuguese</b>		<b>UFRGS</b>	<b>Elective</b>	<b>60h</b>	<b>ECTS : 0</b>
Contents	Evaluation	Horary			
Weakly language training		written exam		lecture	
		oral exam		seminary	
	100%	exercises	60	practice	
		project			
		report		<i>Teaching</i>	
Teaching staff :		presentation		<i>PT</i>	<b>P5 Y2</b>
<b>UFRGS - 531 Master Thesis</b>		<b>UFRGS</b>	<b>Elective</b>	<b>390h</b>	<b>ECTS : 19</b>
Contents	Evaluation	Horary			
Each student should develop and present an original and innovative research project under the supervision (or co-supervision) of a staff member of the UFRGS.		written exam		lecture	
		oral exam		seminary	
		exercises	390	practice	
		project			
	75%	report		<i>Teaching</i>	
Teaching staff :	25%	presentation		<b>P5 Y2</b>	
<b>UFRGS - 532 Hydrothermal Alteration and Metallogeny</b>		<b>UFRGS</b>	<b>Elective</b>	<b>60h</b>	<b>ECTS : 3</b>
Contents	Evaluation	Horary			
Presentation of methodologies for field and laboratory for the understanding of hydrothermal processes in association with the occurrence of clay minerals. X-ray diffraction, chemical microanalysis; sampling and description of the survey evidence, chemical analysis (geochemical mass balance). Applications to ore deposits.		written exam	40	lecture	
		oral exam		seminary	
	50%	exercises	20	practice	
		project			
	25%	report		<i>Teaching</i>	
Teaching staff : Andre S. Mexias (UFRGS); Márcia E.B. Gomes (UFRGS) + external collaborators.	25%	presentation		<i>EN, PT</i>	<b>P5 Y2</b>



UFRGS - 533 Geology of Clay and Clay Minerals Deposits in Brazil		UFRGS	Elective	90h	ECTS : 5
<b>Contents</b> Clay Minerals associated to giant amethyst deposits in basalts floods. Clays in Au, Cu and base metals deposits (epithermal environments). Bentonites in gondwana sedimentary rocks. Supergene and lateritic deposits associated to kaolins (amazonic region).	<b>Evaluation</b>		<b>Horary</b>		
		written exam	30	lecture	
		oral exam		seminary	
	50%	exercises	60	practice	
		project			
	25%	report		<i>Teaching</i>	
<i>Teaching staff : Márcia E.B. Gomes (UFRGS); Andre S. Mexias (UFRGS); Norberto Dani (UFRGS) + external collaborators.</i>	25%	presentation	<i>EN, PT</i>	<b>P5 Y2</b>	
UO - 541 Master Thesis		UO	Elective	600h	ECTS : 24
<b>Contents</b> Each student should develop and present an original and innovative research project under the supervision (or co-supervision) of a staff member of the UO.	<b>Evaluation</b>		<b>Horary</b>		
		written exam		lecture	
		oral exam		seminary	
		exercises	600	practice	
		project			
	75%	report		<i>Teaching</i>	
<i>Teaching staff :</i>	25%	presentation		<b>P5 Y2</b>	