

<i>Basic Teaching Unit:1.1</i>		<i>Coefficient :4</i>	<i>Credits:4</i>	<b>VH:52h30</b>			
				<i>L</i>	<i>T</i>	<i>TW</i>	<i>Other</i>
<i><b>Titled</b></i>	<b>Optronics</b>			<b>15h 00</b>	<b>15h 00</b>	<b>22h 30</b>	<b>55h</b>
<i><b>Objectifs</b></i>	At the end of this module, the student must know how to use the techniques studied on an instrumental level.						
<i><b>Focusedabilities</b></i>							
							Level requirement
<i><b>Content (blocks of skill)</b></i>	<b>The subject's content :</b> <b>Courses and Tutorials</b> ) Integrated optoelectronic components: Integrated waveguide and sensors... 2) Photo-detectors 3) Pockels cells. 4) Acousto-optical components. 5) Controls by optical methods. Speed measurements by gyroscopy, Bragg fiber, plasmonic guide. 6) Non-destructive testing by polarimetry. Fringe method						
<i><b>Type of control and monitoring</b></i>	<b>Continuous monitoring: 60%; Exam: 40%</b>						

<i>Basic Teaching Unit:1.1</i>		<i>Coefficient :3</i>	<i>Credits:3</i>	<b>VH:52h30</b>			
				<i>L</i>	<i>T</i>	<i>TW</i>	<i>Other</i>
<i>Titled</i>	<b>Renewable energy, production and storage</b>			<b>15h 00</b>	<b>15h 00</b>	<b>22h 30</b>	<b>55h</b>
<i>Objectifs</i>	Know the performance of current production and storage technologies, the basics of an installation and the constraints of energy storage						
<i>Focusedabilities</i>							
							Level requirement
<i>Content (blocks of skill)</i>	<b>The subject's content :</b> Renewable energy production technologies and study of associated systems (for example photovoltaic, hydraulic, wind production installations, etc.). Study of technologies dedicated to energy storage. Study and characterization of the performances of different technologies (autonomy, etc.) in standardized modes and real operating modes. Waste recycling.  Case studies, use of simulation software.						
<i>Type of control and monitoring</i>	<b>Continuous monitoring: 60%; Exam: 40%</b>						

<i>Basic Teaching Unit:1.1</i>		<i>Coefficient :3</i>	<i>Credits:3</i>	<b>VH:52h30</b>			
				<i>L</i>	<i>T</i>	<i>TW</i>	<i>Other</i>
<i>Titled</i>	<b>Instrumentation electronics 3</b>			<b>15h 00</b>	<b>15h 00</b>	<b>22h 30</b>	<b>55h</b>
<i>Objectifs</i>	At the end of this module, the student must understand the importance of thin film materials for specific uses.						
<i>Focusedabilities</i>							
						Level requirement	
<i>Content (blocks of skill)</i>	<b>The subject's content :</b> Introduction and general information Power supplies Function generators Multimeters Oscilloscopes Synchronous detection (basics) spectrum analyzers (basics)						
<i>Type of control and monitoring</i>	<b>Continuous monitoring: 60%; Exam: 40%</b>						

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				<i>L</i>	<i>T</i>	<i>TW</i>	<i>Other</i>
<i>Titled</i>	<b>Instrumentation computing 2</b>			<b>15h 00</b>	<b>15h 00</b>	<b>22h 30</b>	<b>55h</b>
<i>Objectifs</i>	At the end of this module, the student must understand the physical mechanisms giving their properties to thin layers.						
<i>Focusedabilities</i>							
						Level requirement	
<i>Content (blocks of skill)</i>	<b>The subject's content :</b> Remote instrument control Architecture of a computer Memoirs File & Input-Output Management						
<i>Type of control and monitoring</i>	<b>Continuous monitoring: 60%; Exam: 40%</b>						

<i>Basic Teaching Unit:1.1</i>		<i>Coefficient :3</i>	<i>Credits:3</i>	<b>VH:52h30</b>			
				<i>L</i>	<i>T</i>	<i>TW</i>	<i>Other</i>
<i>Titled</i>	<b>Acoustic Measurements</b>			<b>15h 00</b>	<b>15h 00</b>	<b>22h 30</b>	<b>55h</b>
<i>Objectifs</i>	Implement measures, particularly normative, in environmental acoustics, building acoustics and industrial acoustics.						
<i>Focusedabilities</i>							
							Level requirement
<i>Content (blocks of skill)</i>	<b>The subject's content :</b> Sources, fields, sensors. Sound measurement. Building acoustics: reverberation time, insulation. Industrial acoustics. Standards and regulations. Ultrasound. Physiological acoustics. Study of the effects of noise pollution on hearing and means of protection. Practical use of a sound level meter and spectrum analyzer Normative measures will have to be implemented. Address the metrological monitoring of instruments. The results must be expressed with their associated uncertainties when the standards provide for it.						
<i>Type of control and monitoring</i>	<b>Continuous monitoring: 60%; Exam: 40%</b>						

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				<i>L</i>	<i>T</i>	<i>TW</i>	<i>Other</i>
<i>Titled</i>	<b>Vibration measurements</b>			<b>15h 00</b>	<b>15h 00</b>	<b>22h 30</b>	<b>55h</b>
<i>Objectifs</i>	Characterize the vibrations of a mechanical system.						
<i>Focusedabilities</i>							
							Level requirement
<i>Content (blocks of skill)</i>	<b>The subject's content :</b> General information on vibrations. Mass-spring-damper system. Free and forced oscillations: frequency response function (module, phase), resonance. Multi-degree of freedom systems: coupled oscillations, natural modes, resonance frequencies of a mechanical structure. Measurement of characteristic quantities (force, acceleration, speed, displacement). Normative measures may be implemented. Address the metrological monitoring of instruments.						
<i>Type of control and monitoring</i>	<b>Continuous monitoring: 60%; Exam: 40%</b>						

<i>Basic Teaching Unit:1.1</i>		<i>Coefficient : 3</i>	<i>Credits:3</i>	<b>VH:52h30</b>			
				<i>L</i>	<i>T</i>	<i>TW</i>	<i>Other</i>
<i>Titled</i>	<b>Networked measurement systems</b>			<b>15h 00</b>	<b>15h 00</b>	<b>22h 30</b>	<b>55h</b>
<i>Objectifs</i>	Know how to configure measurement systems to enable network data exchange.						
<i>Focusedabilities</i>							
						Level requirement	
<i>Content (blocks of skill)</i>	<b>The subject's content :</b> Network instrumentation: analysis and implementation. System configuration, data transfer. Fieldbus, sensor network, home automation.						
<i>Type of control and monitoring</i>	<b>Continuous monitoring: 60%; Exam: 40%</b>						

<i>Basic Teaching Unit:1.1</i>		<i>Coefficient :2</i>	<i>Credits:2</i>	<b>VH:52h30</b>			
				<i>L</i>	<i>T</i>	<i>TW</i>	<i>Other</i>
<i>Titled</i>	<b>Languages, Culture and Communication 5</b>			<b>15h 00</b>	<b>15h 00</b>	<b>22h 30</b>	<b>55h</b>
<i>Objectifs</i>	At the end of this module, the student should have some ideas on labor law issues and human resources management.						
<i>Focusedabilities</i>							
						Level requirement	
<i>Content (blocks of skill)</i>	<b>The subject's content :</b> <b>Courses and Tutorials</b> 1) Consolidation of expression in languages. 2) Professional communication: Writing procedures and user training, Writing internship reports and defenses. ....						
<i>Type of control and monitoring</i>	<b>Continuous monitoring: 60%; Exam: 40%</b>						



<i>Basic Teaching Unit:1.1</i>		<i>Coefficient :2</i>	<i>Credits:2</i>	<b>VH:52h30</b>			
				<i>L</i>	<i>T</i>	<i>TW</i>	<i>Other</i>
<i>Titled</i>	<b>Mathematics for engineering sciences</b>			<b>15h 00</b>	<b>15h 00</b>	<b>22h 30</b>	<b>55h</b>
<i>Objectifs</i>	Master mathematical tools						
<i>Focusedabilities</i>							
						Level requirement	
<i>Content (blocks of skill)</i>	<b>The subject's content :</b> <ul style="list-style-type: none"> <li>• Reminder and additional analysis</li> <li>• Generalized integral</li> <li>• Numerical series, series and Fourier transform</li> <li>• Bessel Plancherel's theorem</li> </ul>						
<i>Type of control and monitoring</i>	<b>Continuous monitoring: 60%; Exam: 40%</b>						