

Master's Degree
Instrumentation, Measurement, Metrology (IMM)
Track (2nd year):

Instrumentation and Measurement Science for Major Nuclear Research Facilities (IMSci-Nu)
2024-2029

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BCC (Skill Blocks)	ECTS	Units	ECTS	Modules	Hours	Total
Master the fundamentals of nuclear fusion and fission and major facilities associated	12	Fundamentals in nuclear fission and fusion	6	Nuclear Physics	14	42
				Radiation-Matter Interactions	7	
				Nuclear fission and fusion reactions	7	
				Plasma, material damage, heat transfer	14	
		Major nuclear facilities and challenges	6	Tokamaks	7	49
				ITER and DEMO	7	
				Research reactors and MTRs, JHR	7	
				Nuclear Power Plants	7	
				Reactor operating principle and control system	7	
				Reactor and tokamak experiments including TBM (Tritium breeding)	7	
Other installations: accelerators, generators, ...	7					
Understand, select and implement instrumentation and detectors	12	Nuclear detection, instrumentation and fusion diagnostics 1	6	Radiation detection	7	49
				Identification of sources of uncertainty	14	
				Non-destructive testing methods	14	
				Nuclear heating rate measurement	7	
				Principle of radioprotection	7	
		Nuclear detection, instrumentation and fusion diagnostics 2	6	Measurements and instrumentation under severe thermo-hydraulic conditions	10.5	35
				Instrumentation for dismantling and remediation	10.5	
				Extreme constraints for tokamak measurement systems	7	
				Thermal measurements (properties, sensors, diagnostics)	7	
Carry out modeling and experiments	6	Modeling	3	Particle transport modeling (course)	7	24.5
				Particle transport modeling (practical)	7	
				Thermal and fluid modeling (course)	3.5	
				Thermal and fluid modeling (practical)	7	
		Experimental work	3	Practical work on major nuclear facilities (remote, 3D)	14	35
				Hands-on activities on detectors/sensors and associated simulations	21	
30	Total S1	30				234.5

Conduct a research project and communicate scientifically and internationally	12	Interculturality, international communication and scientific seminars	6	Interculturality, international communication	10.5	49
				Written and oral communication for internship and professional project	10.5	
				Scientific seminar series (winter school, remote, in-person)	28	
Research project	6	Research project with bibliographical, experimental and numerical activities	42	42		
Professionalize in a scientific and international environment	18	Professionalization and internship	18	Remote and in-person visits (major facilities in France and abroad, laboratories, platforms)	14	14
				4 to 6 month internship on major facilities in France or abroad with thesis and oral presentation		
30	Total S2	30				105
60	TOTAL M2	60				339.5