ECOLE NATIONALE SUPERIEURE
D'ELECTRICITE ET DE MECANIQUE
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54500 Vandoeuvre-lès-Nancy

LORRAINE INP Ensem

Academic year 2025-2026

Synthetic curriculum 2025-2026 NRJ_FISE

Semester S5

Code	Course Unit	ECTS	Code	Course	Coeff	*Teacher*	Vol	CM	TD	TP
5JUPLN02	Tools for mathematics	5	5JEPLN20	Mathematics for engineers	0,6	*A. Gueudin*	**32**	16	16	0
			5JEPLN21	Numerical Analysis 1	0,4	*?*	**20**	8	6	6
5JUPLN01	Foundations of mechanics	5	5JEPLN10	continuum mechanics	0,5	*C. Laurent*	**30**	16	14	0
			5JEPLN11	Thermodynamics	0,5	*G. Pernot*	**30**	16	14	0
5JUPLN03	Electricity 1	5	5JEPLN30	Fundamentals of Electrical Engineering	0,5	*F. Meibody*	**30**	14	10	6
			5JEPLN31	Electrical Circuits and Applications	0,5	*T. Boileau*	**30**	12	10	8
5JUPLN04	Information and computer sciences 1	5	5JEPLN40	Modeling of signals and systems	0,4	*V. Louis-Dorr*	**23**	9	4	10
			5JEPLN41	Logical and discrete event systems	0,1	*J.-F. Pétin*	**7**	4	3	0
			5JEPLN42	Algorithms and programming	0,5	*?*	**30**	7	5	18
5JUPLN05	Languages 1	5	5JEPLN50	English	0,5	*C. Corringer*	**24**	0	24	0
			5JEPLN51	Modern languages 2	0,5	*A. Quesada*	**24**	0	24	0
			5JEPLN52	Validation of the French language clearance certificate	pass/fail	*A. Quesada*	**1**	0	1	0
5JUPLN06	General Training 1	5	5JEPLN60	Business environment	0,3	*F. Temsamani*	**20**	14	6	0
			5JEPLN64	Electrical Accreditation and Health at Work	pass/fail	*T. Boileau*	**8**	8	0	0
			5JEPLN68	CSR 1	pass/fail	*V. Louis-Dorr*	**11**	2	9	0
			5JEPLN67	Industrial conferences	pass/fail	*P. Villette*	**6**	6	0	0
			5JEPLN61	Communication	0,3	*A. Thimon*	**16**	0	16	0
			5JEPLN62	Project management	0,4	*J.-C. Marpeau*	**18**	2	16	0
			5JEPLN63	1st year project	pass/fail	*J.-C. Marpeau*	**30**	0	0	30

Semester S6

Code	Course Unit	ECTS	Code	Course	Coeff	*Teacher*	Vol	CM	TD	TP
6JUPLN03	Tools for mathematics 2	5	6JEPLN30	Probability and Statistics	0,4	*A. Gueudin*	**34**	18	16	0
			6JEPLN31	Optimization & Graph	0,3	*P. Riedinger*	**30**	16	14	0
			6JEPLN32	Numerical Analysis 2	0,3	*?*	**20**	8	6	6
6JUPLN01	Applied Mechanics	5	6JUPLN10	Mechanics for the engineer	0,5	*J.-F. Schmitt*	**30**	14	8	8
			6JUPLN11	Fluid mechanics and applications	0,5	*N. Rimbert*	**30**	12	10	8
6JUPLN04	Electricity 2	5	6JEPLN40	Electrical machines	0,5	*D. Netter*	**30**	13	8	9
			6JEPLN41	Power electronics	0,5	*L. Baghli*	**30**	13	8	9
6JUPLN05	Information Sciences 2	5	6JEPLN50	Automatic - Dynamics and Control of Systems	0,5	*J. Daafouz*	**30**	14	7	9
			6JEPLN51	Algorithmics and Object-Oriented Programming	0,5	*V. Chevrier*	**30**	7	5	18
6JUPLN06	Languages 2	5	6JEPLN60	English	0,5	*C. Corringer*	**24**	0	24	0
			6JEPLN61	Modern Languages 2	0,5	*A. Quesada*	**24**	0	24	0
			6JEPLN62	Validation of the French language clearance certificate	pass/fail	*A. Quesada*	**1**	0	1	0
6JUPLN07	General Training 2	5	6JEPLN72	Management	0,2	*F. Temsamani*	**16**	10	6	0
			6JEPLN73	Innovation and Entrepreneurship	0,2	*F. Temsamani*	**12**	0	12	0
			6JEPLN70	Electrical authorization and occupational health	pass/fail	*T. Boileau*	**0,5**	0	0	0,5
			6JEPLN76	CSR 2	pass/fail	*C. Laurent*	**14**	8	6	0
			6JEPLN71	Industrial conferences	pass/fail	*P. Villette*	**6**	6	0	0
			6JEPLN74	Communication and professional integration	0,2	*A. Thimon*	**14**	2	12	0
			6JEPLN75	1st year project	0,4	*J.-C. Marpeau*	**20**	0	0	20

Semester S7

Code	Course Unit	ECTS	Code	Course	Coeff	*Teacher*	Vol	CM	TD	TP
7JUNRJ02	Tools for the engineer	4	7JENRJ20	Distributions	0,33	*?*	**15**	9	6	0
			?	Introduction to AI	0,33	*?*	**15**	9	6	0
			7JENRJ21	partial differential equations	0,33	*?*	**15**	9	6	0
7JUNRJ03	Energy conversion	5	7JENRJ30	Electromechanical conversion of energy	0,33	*A. Labergue*	**24**	8	4	12
			7JENRJ31	Energy conversion chain' design office	0,33	*M.Urbain*	**26**	6	0	20
			7JENRJ32	Materials for energy	0,33	*G. Pernot*	**20**	8	12	0
7JUNRJ04	Mechanics	5	7JENRJ40	Introduction to heat transfers	0,5	*S. Didierjean*	**30**	8	12	10
			7JENRJ41	Mechanics of rotating machines	0,5	*M.Bordron*	**30**	16	10	4
7JUNRJ05	Electrical Engineering	5	7JENRJ50	Power Electronics	0,5	*S. Pierfederici*	**30**	16	6	8
			7JENRJ51	Electrical machines	0,5	*N. Takorabet*	**30**	10	8	12
7JUNRJ06	Information Sciences 3	5	7JENRJ06	Signal processing	0,5	*D. Wolf*	**30**	18	8	4
			7JENRJ61	Sensor networks	0,5	*?*	**30**	10	5	15
7JUNRJ01	General training 3	6	7JENRJ14	CSR 3	pass/fail	*B. Remy*	**14**	10	4	0
			7JENRJ15	Industrial conferences	pass/fail	*P. Villette*	**6**	6	0	0
			7JENRJ10	Communication and professional integration	0,1429	*F. Temsamani*	**14**	6	8	0
			7JENRJ11	Accounting Management	0,2857	*J. Binet*	**18**	6	12	0
			7JENRJ12	English	0,2857	*C. Corringer*	**24**	0	24	0
			7JENRJ13	Living Language 2	0,2857	*A. Quesada*	**24**	0	24	0

Semester S8

Code	Course Unit	ECTS	Code	Course	Coeff	*Teacher*	Vol	CM	TD	TP
			8JENRJ10	English	0,25	*C. Corringer*	**24**	0	24	0
			8JENRJ11	Modern Languages 2	0,25	*A. Quesada*	**24**	0	24	0
8JUNRJ01	General Training 4	**6**	8JENRJ13	CSR	0,25	*F. Temsamani*	**14**	8	6	0
			8JENRJ14	Industrial Conferences - Research Day	pass/fail	*B. Remy*	**12**	12	0	0
			8JENRJ12	Marketing Strategy & Business Simulation	0,25	*J.-C. Marpeau*	**21**	3	18	0
			8JENRJ20	Electrical Network Modeling	0,2	*S. Dufour*	**16**	8	4	4
			8JENRJ21	Integration of renewable energies	0,2	*J.-P. Martin*	**16**	10	2	4
8JUNRJ02	8-01 General Knowledge of Networks, Sources and Storage Elements	**6**	8JENRJ22	Characteristics of energy sources and storage elements	0,2	*A. Labergue*	**18**	18	0	0
			8JENRJ23	Heat networks	0,2	*B. Remy*	**14**	6	4	4
			8JENRJ24	Case study	0,2	*M.Urbain*	**16**	0	0	16
8JUNRJ03	8-02 Dynamic Modeling and Electrical Machine Drives	**6**	8JENRJ30	Modeling and control of electrical machines	0,5	*F. Meibody*	**40**	20	12	8
			8JENRJ31	Electrical machines connected to the network - failures and transien	0,5	*N. Takorabet*	**40**	16	8	16
8JUNRJ04	8-03 Advanced Power Electronics for Sationary and Embedded applications	**6**	8JENRJ40	Current and emerging power supply structures	0,5	*S. Pierfederici*	**40**	20	8	12
			8JENRJ41	Digital integration	0,5	*J.-P. Martin*	**40**	8	0	32
			8JENRJ80	Thermodynamics of energy systems	0,5	*S. Didierjean*	**40**	10	20	10
8JUNRJ08	8-04 Energy Transfer and Conversion	**6**	8JENRJ81	Heat and mass transfer	0,38	*A. Labergue*	**30**	10	8	12
			8JENRJ82	Fluid energy conversion	0,12	*O. Caballina*	**10**	6	4	0
			8JENRJ50	Turbulence	0,25	*O. Caballina*	**20**	12	8	0
8JUNRJ05	8-05 Fluid Mechanics for the Engineer	**6**	8JENRJ51	Aerodynamic	0,25	*A. Pereira*	**20**	12	8	0
			8JENRJ52	Fluid-structure interactions	0,25	*N. Louvet*	**20**	12	8	0
			8JENRJ53	Case study	0,25	*N. Louvet*	**20**	2	0	18
			8JENRJ60	Computer Aided Design	0,25	*M.Bordron*	**30**	0	0	30
8JUNRJ06	8-06 Design and dimensioning of solids and structures	**6**	8JENRJ61	Life cycle analysis	0,25	*M. Bordron*	**10**	6	4	0
			8JENRJ62	Manufacturing technologies and processes	0,25	*M. Bordron*	**20**	10	2	8
			8JENRJ63	Sizing case studies	0,25	*J.-F. Schmitt*	**20**	2	0	18
			8JENRJ72	Cryptography, Cybersecurity of industrial systems	0,25	*? / J. Daafouz*	**20**	8	4	8
8JUNRJ07	8-07 Safety and Cybersecurity	**6**	8JENRJ73	Distributed Systems, Web Services and Blockchain	0,25	*V. Chevrier*	**20**	8	0	12
			8JENRJ70	Analysis and evaluation of discrete event systems performance	0,25	*J.-F. Pétin*	**20**	8	4	8
			8JENRJ71	Operational Safety	0,25	*N. Brinzei*	**20**	10	4	6
			8JENRJ90	Signal processing and data transmission	0,38	*V. Louis-Dorr*	**30**	16	6	8
8JUNRJ09	8-08 Signals, Data and the IoT	**6**	8JENRJ91	Databases	0,38	*YQ Song*	**30**	10	8	12
			8JENRJ92	Implementing an Internet of Things application	0,25	*?*	**20**	2	0	18
			8JENR101	Numerical control	0,25	*J. Daafouz*	**20**	10	4	6
8JUNRJ10	8-09 Stability, Control and Digital Integration	**6**	8JENR102	Stability and stabilization of systems	0,25	*R. Postoyan*	**18**	10	4	4
			8JENR103	Digital integration with microcontrollers	0,25	*?*	**20**	8	0	12
			8JENR104	Smart grid application	0,25	*J. Daafouz*	**20**	4	4	12
			8JENR110	Introduction to Pattern Recognition	0,25	*S. Le Cam*	**24**	12	12	0
8JUNRJ11	8-10 Artificial Intelligence, Data Analysis and Machine Learning	**6**	8JENR111	Core method - wide margin separators	0,25	*M.Kallas-Edelson*	**12**	6	6	0
			8JENR112	Neural networks	0,25	*M.Kallas-Edelson*	**12**	6	6	0
			8JENR113	Design office	0,25	*S. Le Cam*	**32**	0	0	32
8JUNRJ12	8-11 Numerical Modeling and Simulation in Electrical Engineering	**6**	8JENR120	Analytical and digital BF electromagnetism	0,5	*J. Fontchastagner*	**40**	16	8	16
			8JENR121	Simulations of electromagnetic devices	0,5	*C.-H. Bonnard*	**40**	4	0	36
			8JENR130	Introduction to numerical simulation in Mechanics & Thermal Engin	0,33	*B. Remy*	**28**	8	0	20
8JUNRJ13	8-12 Numerical Modeling and Simulation in Thermal, Fluid and Solid Mechanics	**6**	8JENR131	Digital CAD Tools - Fluid Mechanics - Thermal	0,33	*N. Rimbert*	**26**	6	0	20
			8JENR132	Finite element analysis of machines & structures	0,33	*C. Laurent*	**26**	6	0	20
8JUNRJ14	8-H2 Hydrogen Track: From Production to Energy Applications	**6**	8JENR140	H2 electrochemical systems	0,5	*G. Sdanghi*	**42**	42	0	0
			8JENR141	Practical work & Case study	0,5	*M.Hinaje*	**38**	0	0	38
			8JE47N27	Fundamentals of Nuclear Energy (FST)	0,25	*X. Caron*	**20**	20	0	0
8JUNRJ15	8-Nuclear-1 Nuclear Training – Core Curriculum	**6**	8JE47N28	Upstream and downstream nuclear fuel cycle (FST)	0,25	*JS Kroll-Rabotin*	**18**	18	0	0
			8JENR150	Digital Methods & Tools	0,5	*N. Rimbert*	**42**	6	0	36
			8JENR160	Thermo-Hydraulics	0,25	*A. Labergue*	**20**	10	4	6
8JUNRJ16	8-Nuclear-2 Nuclear Training - Mechanics & Energy	**6**	8JENR161	Turbulence (nuclear formation)	0,25	*O. Caballina*	**20**	12	8	0
			8JENR162	Heat networks & thermodynamic systems	0,25	*B. Remy*	**20**	6	6	8
			8JENR163	Multiphysical behavior of materials, stress corrosion cracking	0,25	*JF. Ganghoffer*	**20**	16	4	0
			8JENR170	Transient regimes of synchronous alternators	0,25	*N. Takorabet*	**20**	8	4	8
8JUNRJ17	8-Nuclear-3 Nuclear Training - Electrical Engineering	**6**	8JENR171	Modeling of electrical networks	0,25	*S. Dufour*	**20**	8	4	8
			8JENR172	Modeling and control of electrical machines	0,5	*F. Meibody-Tabar*	**40**	20	12	8
			8JENR180	Cryptography, Cybersecurity of industrial systems	0,25	*?*	**20**	8	4	8
8JUNRJ18	8-Nuclear-4 Nuclear Training - Information Sciences	**6**	8JENR181	Operational safety (nuclear training)	0,25	*N. Brinzei*	**20**	10	4	6
			8JENR182	Numerical control (nuclear training)	0,25	*J. Daafouz*	**20**	8	4	8
			8JENR183	Stability and stabilization of systems (nuclear training)	0,25	*R. Postoyan*	**20**	12	4	4
	Projects (foreign students)	**25**		Projects (foreign students)	1	*S. Gallaire*				

Semester S9

Code	Course Unit	ECTS	Code	Course	Coeff	Teacher	Vol	CM	TD	TP
9KUFGN06	General Training 5	5	9KEFGN61	Bank English	0,5	*C. Corringer*	**24**		24	0
			9KEFGN64	Professional integration	0,5	*F. Temsamani*	**30**	15	15	0
			9KEFGN65	Energy research	pass/fail	*B. Remy*	**20**	20	0	0
			9KEFGN67	Validation of international experience	pass/fail	*S. Gallaire*	**1**	0	1	0
9KUFGN15	Project	5	9KEFGN51	Academic R&D Project - Industrial R&D Project	0,6	*J.-C. Perrin*	**60**	0	0	60
			9KEFGN52	Cross-functional design office	0,4	*T. Boileau / V. Louis-Dorr*	**30**	0	0	30
9KUNRJ09	9_1 Risk analysis and monitoring of energy systems	5	9KENRJ91	Risk analysis and functional security	0,5	*N. Brinzei*	**30**	18	4	8
			9KENRJ92	Monitoring and Diagnosis	0,5	*S. Maza*	**30**	20	10	0
9KUNRJ11	9_2 Modeling and Analysis of Electromechanical Systems using Data-Based Approach	5	9KENRJ10	Inverse problems, Decompositions, Parsimony	0,33	*R. Ranta*	**20**	10	10	0
			9KENRJ11	Pattern identification and reduction	0,33	*M.Giaccagli*	**20**	12	8	0
			9KENRJ12	Design offices	0,33	*M. Giaccagli / R. Ranta*	**20**	0	0	20
9KUNRJ27	9_3 Event Control and Reinforcement Learning	5	9KENR270	Event Control	0,33	*R. Postoyan*	**20**	8	4	8
			9KENR271	Optimal Control and Reinforcement Learning	0,33	*J. Daafouz*	**20**	8	4	8
			9KENR272	Design offices	0,33	*J. Daafouz / R. Postoyan*	**20**	0	0	20
9KUNRJ28	9_4 Management of energy and transport systems	5	9KENR280	Control over the challenges of transport and conversion	0,5	*J. Kreiss*	**30**	0	30	0
			9KENR281	Nuclear automation and control design office	0,5	*J.-F. Pétin*	**30**	6	2	22
9KUNRJ13	9_5 Autonomous and on-board electrical networks	5	9KENRJ30	Electrical energy quality - Static and dynamic stability	0,5	*S. Pierfederici*	**30**	14	0	16
			9KENRJ31	Energy management in microgrids	0,5	*J.-P. Martin*	**30**	16	2	12
9KUNRJ29	9_6 Electrical Machines (modeling & design)	5	9KENR290	Analytical modeling and optimization of electrical machines	0,5	*D. Netter*	**30**	0	0	30
			9KENR291	Optimization and design of electrical machines	0,5	*N. Takorabet*	**30**	16	2	12
9KUNRJ15	9_7 Electromechanical Conversion with High-Availability	5	9KENRJ50	High Availability Electromechanical Conversion - Part 1	0,5	*F. Meibody*	**30**	22	0	8
			9KENRJ51	High Availability Electromechanical Conversion - Part 2	0,5	*T. Boileau*	**30**	14	0	16
9KUNRJ16	9_8 ETNP components in their environment	5	9KENRJ60	Power semiconductor components	0,5	*St. Rael*	**30**	22	0	8
			9KENRJ61	Electromagnetic compatibility	0,5	*M.Urbain*	**30**	14	0	16
9KUNRJ17	9_9 Electrical storage systems	5	9KENRJ70	Electrochemical storage of electrical energy	0,5	*M.Hinaje*	**30**	18	0	12
			9KENRJ71	Interface power electronics converters	0,5	*S. Pierfederici*	**30**	14	0	16
9KUNRJ18	9_10 “Power-Hardware-In-The-Loop” (P-HIL)	5	9KENRJ80	P-HIL - tools and techniques	0,5	*E. Jamshidpour*	**30**	10	0	20
			9KENRJ81	P-HIL Project	0,5	*C.-H. Bonnard*	**30**	0	10	20
?	9_11 Advanced Fluid Mechanics	5	?	High-speed flows and combustion conversion	?	*F. Lemoine*	**25**	25	0	0
			?	Multiphase flows and interfaces	?	*N. Rimbert*	**20**	14	0	6
			?	Turbulence modeling	?	*O. Caballina*	**15**	10	0	5
?	9_12 Heat and mass transfer	5	?	Heat exchangers and waste heat recovery	?	*N. Rimbert*	**20**	20	0	0
			?	Flow in complex media	?	*N. Louvet*	**20**	20	0	0
			?	Heat transfers at interfaces and participating media	?	*B. Remy*	**20**	20	0	0
?	9_13 Simulate, measure and visualize	5	?	Methodology for characterizing	0,33	*A. Labergue*	**20**	20	0	0
			?	Experimental characterization	0,33	*G. Pernot*	**20**	0	0	20
			?	Numerical simulations and applications	0,33	*O. Caballina*	**20**	0	0	20
?	9_14 Materials Science and Behavior	5	?	Materials Science	0,33	*M.Bordron*	**20**	8	4	8
			?	Mechanical behavior of materials	0,67	*C. Laurent*	**40**	14	6	20
?	9_15 Nuclear	5	?	Nuclear and Society (SHJEJS)	0,33	*?*	**14**	14	0	0
			?	Design and operation of nuclear installations	0,33	*?*	**28**	28	0	0
			?	Advanced study	0,33	*?*	**18**	18	0	0
9KUETR06	Projects (foreign students)	**25**	9KUETR60	Projects (foreign students)	1	*S. Gallaire*				

Semester S10

Code	Course Unit	ECTS	Code	Course	Coeff	Teacher	Vol	CM	TD	TP
0KSTAG01	Engineering or R&D Internship	**30**	0KSTAGE3	Engineering Internship	1					