CentraleSupélec

EXCHANGE PROGRAM 2021-22:
Course selection instructions

The CentraleSupélec Engineering Curriculum spans over 3 years (6 semesters).
Each semester comprises 2 terms:

- **an "Engineering Challenge" Term (in French** *Séquence Thématique* or *ST)*;
- **an Academic Term (in French** *Séquence Générale* or *SG).*

<table>
<tr><th colspan="5">CentraleSupélec Engineering Curriculum in relation to the French/European system</th><th colspan="2">Equivalent in the European higher education system</th></tr>
<tr><td rowspan="4">Preparatory classes in France:
"Prépa"</td><td rowspan="2">1st year</td><td>Semester 1</td><td rowspan="4"></td><td rowspan="2">year 1</td><td rowspan="4"></td></tr>
<tr><td>Semester 2</td></tr>
<tr><td rowspan="2">2nd year</td><td>Semester 3</td><td rowspan="2">year 2</td></tr>
<tr><td>Semester 4</td></tr>
<tr><td rowspan="8">CentraleSupélec Engineering Curriculum</td><td rowspan="4">1st year</td><td rowspan="2">Semester 5 - S5</td><td>SG 1</td><td rowspan="4">year 3</td><td rowspan="6">BSc</td></tr>
<tr><td>ST 2</td></tr>
<tr><td rowspan="2">Semester 6 - S6</td><td>SG 3</td></tr>
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<tr><td rowspan="4">2nd year</td><td rowspan="2">Semester 7 - S7
FALL</td><td>ST 5</td><td rowspan="4">year 4</td></tr>
<tr><td>SG 6</td></tr>
<tr><td rowspan="2">Semester 8 - S8
SPRING</td><td>ST 7</td></tr>
<tr><td>SG 8</td></tr>
<tr><td rowspan="4">3rd year</td><td rowspan="2">Semester 9 - S9</td><td>SD9</td><td rowspan="4">year 5</td><td rowspan="4">MSc</td></tr>
<tr><td>SM 10</td></tr>
<tr><td rowspan="2">Semester 10 - S10</td><td>SM11</td></tr>
<tr><td>Internship</td></tr>
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The second year at CentraleSupélec is open to exchange students coming either for the Fall Semester "S7" (September to January) or the Spring Semester "S8" (February to June), or both.

Detailed course descriptions can be found in the catalogue 2020-2021.
To know the language of instruction for each course, please refer to the course list below.
Please note that changes can still occur before your arrival.

FALL SEMESTER "S7": ORGANIZATION & SELECTION OF COURSES

You are free to select any course from this program, taking into consideration several rules explained below.
The full course load of the engineering program is usually 30 ECTS per semester. Depending on the requirements of your home institution, you may either take the full course load, additional courses, or choose a minimum of 24 ECTS.
The school has 3 campuses: Saclay, Rennes and Metz. **Be sure to choose a full set of courses in one campus only.**

This document is for information purposes only. Course choices will be collected via an online survey (a link will be sent to nominated candidates).

"Engineering Challenge" Term, or *Séquence Thématique*: ST5

This term runs from September to mid-November, and comprises:

- A course series including:
  - An introductory module
  - A specific course
  - A Challenge Week, in French *Enseignement d'intégration,* scheduled at the end of the term (**choice of challenge week topic will be made upon arrival)**
- Common core courses: Automatic Control and System Modelling

Students are invited to choose 1 of the 14 "ST" topics, as well as a back-up in case their top choice cannot be accommodated.
The Automatic Control course is not mandatory, but it is a strong prerequisite for the ST: **you must attend it if you do not have the sufficient background in this field.**

Academic Term, or *Séquence Générale*: SG6

This term runs from late November to late January, and comprises:

- 3 elective courses

The courses are distributed in 3 series: 2.1, 2.2 and 2.3. All courses from a given series are scheduled in the same time slot. Therefore, it is not possible to attend more than 1 course per series.
Please select 1 "top" choice + 1 "back-up" per series.

The semester also includes:

- A 1-week seminar scheduled at the beginning of September: **Business Games**
- An **intensive 1-week seminar** scheduled late November: if you are interested in this seminar, you may select:
  - One topic related to Humanities and Social Sciences (labelled ***2IN2310, 2IN2320, 2IN2330, 2IN2340***). In this case, you will be requested to choose a specific module within the topic at a later stage
    OR
  - An additional elective course (related to: Physics, Management, Computer science, etc.). **Please note that, due to limited seats in these modules, your choice may not be accommodated**.

  If you are interested in this seminar, you may select 1 "top" choice + 1 "back-up" choice.
- Semester-long courses: **Economics**, **Law**, **Sociology of Organizations, Climate Science** and a **team project.**
- **Workshops:** Engineering Skills Workshops ("*API*") and Professional Practice Skills Workshops ("*APP"*).
- **Language courses:** Students choose at least 1, and up to 2 foreign language(s) from the list. **Priority is given to French and English**. If you are already fluent in the latter, you may skip the language courses, or choose another language (in gray). **This option is available only if you have already had at least two semesters of study of the chosen language just prior to your arrival at CentraleSupélec. You cannot select a language in which you are a native speaker.**
- **Sports:** CentraleSupélec offers a range of sports courses which international students are encouraged to join, but for which they do not receive ECTS. If you are interested, please visit the Sports Office when you arrive on campus.

COURSE LIST FOR ACADEMIC YEAR 2021 - 2022 : FALL SEMESTER / "S7"

F: French E: English

SEQUENCE THEMATIQUE "ST5" / ENGINEERING CHALLENGE TERM							
Choice 1	Choice 2	FR Course title	Eng Course title	Course code	ECTS	Campus	Language of Instruction
□	□	**Pilotage et contrôle de vol dans le transport aéronautique et spatial :**	**Flight Control in Aeronautical and Space Transport:**	**ST 51**	**5**	**Paris Saclay**	**F**
		Intro: module contexte et enjeu	Introductory module	2SC5100	0,5		
		Performances et trajectoires de vol	Performance and flight paths	2SC5110	2,5		
challenge week to be chosen upon arrival		Stratégie de contrôle d'un nanosatellite OU	Control Strategy of a Nanosatellite OR	2SC5191	2		
		Définition et conception de la mission d'un lanceur OU	Definition and Design of a Launcher Mission OR	2SC5192	2		
		Conception d'un avion	Aircraft Design	2SC5193	2		
□	□	**Commande de bioprocédés pour une production durable :**	**Bioprocess Control for Sustainable Production:**	**ST 52**	**5**	**Paris Saclay**	**F**
		Intro: module contexte et enjeu	Introductory module	2SC5200	0,5		
		Ingénierie des procédés: application à l'environnement et aux productions durables	Chemical Engineering: application to environment and sustainable production	2SC5210	2,5		
challenge week to be chosen upon arrival		Traitement biologique optimisé des eaux résiduaires urbaines OU	Optimized biological treatment of urban wastewater OR	2SC5291	2		
		Procédé innovant de fermentation continue de levain OU	Innovative Process of Continuous Sourdough Fermentation OR	2SC5292	2		
		Supervision avancée de la production de biogaz à partir de déchets	Advanced Supervision of Biogas Production from Waste	2SC5293	2		
□	□	**Véhicule intelligent et communiquant :**	**Smart and Communicating Vehicle:**	**ST 53**	**5**	**Paris Saclay**	**F**
		Intro: module contexte et enjeu	Introductory module	2SC5300	0,5		
		Architecture et technologies pour le véhicule intelligent et communiquant	Architecture and technologies of smart and communicating vehicles	2SC5310	2,5		
		Livraison urbaine par véhicules autonomes et connectés	Urban Delivery by autonomous and connected vehicles	2SC5390	2		
□	□	**L'éco-quartier, un système complexe. Aménagement durable & management de projet complexe :**	**Ecological District, a Complex System. Sustainable Management and Complex Project Management:**	**ST 54**	**5**	**Paris Saclay**	**F**
		Intro: module contexte et enjeu	Introductory module	2SC5400	0,5		
		Aménagement et urbanisme duables	Sustainable Urban Planning	2SC5410	2,5		
		Projet de conception d'un éco-quartier	Eco-district Design Project	2SC5490	2		
□	□	**Lumière et matière: développement d'instruments de haute technologie:**	**Light and Matter: Development of High Technology Instruments:**	**ST 55**	**5**	**Paris Saclay**	**F**
		Intro: module contexte et enjeu	Introductory module	2SC5500	0,5		
		Physique de la matière	Physics of Matter	2SC5510	2,5		
challenge week to be chosen upon arrival		Conception d'un faisceau de rayons X Synchrotron OU	Synchrotron X-ray Beamline Design OR	2SC5591	2		
		Lasers à cascade quantique	Quantum Cascade Lasers	2SC5592	2		
□	□	**Systèmes multi-énergies:**	**Multi-Energy Systems:**	**ST 56**	**5**	**Paris Saclay**	**F**
		Intro: module contexte et enjeu	Introductory module	2SC5600	0,5		
		Introduction à la production d'énergie	Introduction to Energy Production	2SC5610	2,5		
challenge week to be chosen upon arrival		Régulation et commande de systèmes de production et de conversion d'énergie OU	Regulation and Control of Energy Production and Conversion Systems OR	2SC5691	2		
		Groupe motopropulseur hybride OU	Hybrid Power Train OR	2SC5692	2		
		Propulsion aéronautique hybride	Hybrid Aeronautical Propulsion	2SC5693	2		
□	□	**Contrôle de la pollution acoustique et électromagnétique:**	**Control of Acoustic and Electromagnetic Pollution:**	**ST 57**	**5**	**Paris Saclay**	**F**
		Intro: module contexte et enjeu	Introductory module	2SC5700	0,5		
		Théorie et algorithmique pour le contrôle des ondes	Theory and Algorithms for wave control	2SC5710	2,5		
challenge week to be chosen upon arrival		Contrôle de la pollution acoustique extérieure OU	Control of External Acoustic Pollution OR	2SC5791	2		
		Contrôle de la pollution acoustique intérieure OU	Indoor Noise Pollution Control OR	2SC5792	2		
		Contrôle de la pollution électromagnétique	Control of Electromagnetic Pollution	2SC5793	2		

□	□	**Systèmes complexes industriels et critiques à logiciels prépondérants:**	**Industrial Complex and Critical Systems with Prepondering Softwares:**	**ST 58**	**5**	**Paris Saclay**	**F**
		Intro: module contexte et enjeu	Introductory module	2SC5800	0,5		
		Conception et vérification de systèmes critiques	Design and verification of critical systems	2SC5810	2,5		
challenge week to be chosen upon arrival		Conception d'un système de signalisation sûre pour le ferroviaire OU	Design of a Safe Signalling System for the Railway OR	2SC5891	2		
		Système intelligent pour le contrôle automatisé du trafic aérien OU	Intelligent System for Automated Control of Air Traffic OR	2SC5893	2		
		Systèmes de production pour "usines intelligentes"	Production Systems for "smart factories"	2SC5894	2		
□	□	**Assistance et autonomie de la personne:**	**Assistance and Autonomy of the Person:**	**ST 59**	**5**	**Metz**	**F**
		Intro: module contexte et enjeu	Introductory module	SC5900	0,5		
		Commande d'une chaîne de motorisation	Control of a motorization chain	2SC5910	2,5		
		Fauteuil roulant motorisé pour personne handicapée	Motorized Wheelchair for Disabled Person	2SC5990	2		
□	□	**Navigation semi-autonome de drones:**	**Semi-Autonomous UAV Navigation:**	**ST 60**	**5**	**Metz**	**E**
		Intro: module contexte et enjeu	Introductory module	2SC6000	0,5		
		Robotique autonome	Autonomous Robotics	2SC6010	2,5		
		Navigation semi-autonome de drones en environnement intérieur	Semi-autonomous UAV indoor navigation	2SC6090	2		
□	□	**Systèmes photoniques intelligents de commande et de mesure:**	**Intelligent Control and Measurement Photonic Systems:**	**ST61**	**5**	**Metz**	**E**
		Intro: module contexte et enjeu	Introductory module	2SC6100	0,5		
		Photonique pour le contrôle des systèmes physiques	Photonics for the control of physical systems	2SC6110	2,5		
		Télédétection laster (LIDAR)	Laser Remote Sensing (LIDAR)	2SC6190	2		
□	□	**Intelligence énergétique et smart building :**	**Energy Intelligence and Smart Building:**	**ST62**	**5**	**Rennes**	**E**
		Intro: module contexte et enjeu	Introductory module	2SC6200	0,5		
		Communications à haute performance énergétique OU Modélisation Systèmes	High energy performance communications OR System Modelling	**2SC6210 or**	2,5		
		Pilotage hiérarchisé du confort thermique	Hierarchical control of thermal comfort	2SC6290	2		
□	□	**Systèmes intelligents et embarqués pour la santé :**	**Intelligent and Embedded Healthcare Systems:**	**ST63**	**5**	**Rennes**	**F**
		Intro: module contexte et enjeu	Introductory module	2SC6300	0,5		
		Communications à haute performance énergétique OU Modélisation Systèmes	High energy performance communications OR System Modelling	**2SC6210 or**	2,5		
		Système intelligent pour la régulation personnalisée de glycémie	Smart System for personalized blood glucose control	2SC6390	2		
□	□	**Modélisation et conception d'un système de supervision de capteurs :**	**Modeling and Design of a Sensor Supervision System:**	**ST64**	**5**	**Rennes**	**F**
		Intro: module contexte et enjeu	Introductory module	2SC6400	0,5		
		Modèles de données et schémas de conception	Data Models and design schemes	2SC6410	2,5		
		Développement d'un système de supervision de capteurs	Development of a sensor monitoring system	2SC6490	2		

COURS DE TRONC COMMON / COMMON CORE COURSES							
Choices		FR Course title	Eng Course title	Course code	ECTS	Campus	Language of Instruction
□ E	□ F	Automatique	Automatic Control	2CC1000	2,5	all	E or F in P-Saclay and Rennes, F in Metz
□ E	□ F	Modélisation Systèmes	Systems Modelling	2CC2000	0	all	E or F in P-Saclay, F in Rennes and Metz

SEQUENCE GENERALE "SG6" / ACADEMIC TERM							
ELECTIVE SERIES 2.1							
Choice 1	Choice 2	FR Course title	Eng Course title	Course Code	ECTS	Campus	Language of Instruction
□	□	Systèmes Dynamiques en Neurosciences	Dynamical systems in neurosciences	2EL1110	2,5	Paris Saclay	E
□	□	Conversion d'énergie	Energy conversion	2EL1320	2,5	Paris Saclay	F
□	□	Mécanique des Fluides	Fluid Mechanics	2EL1420	2,5	Paris Saclay	F
□	□	Distribution et opérateurs	Distribution et opérateurs	2EL1720	2,5	Paris Saclay	F
□	□	Mécanique avancée pour le génie civil: "Construire sur Mars"	Advanced Mechanics for Civil engineering: "Building on Mars"	2EL1840	2,5	Paris Saclay	F
□	□	Compréhension, optimisation et simulation des procédés biotechnologiques	Understanding, optimisation and simulation of biotechnological processes	2EL2010	2,5	Paris Saclay	E
□	□	Economie de l'innovation et de la croissance	Economics of growth and innovation	2EL2170	2,5	Paris Saclay	F
□	□	Capteurs intégrés MEMS	MEMS Integrated Sensors	2EL2530	2,5	Paris Saclay	E
□	□	Réseaux de communication mobiles et services	Mobile communication networks and services	2EL2620	2,5	Paris Saclay	F
□	□	Conception de systèmes électroniques complexes: du composant au ssytème hétérogène	Design of Complex Electronic Systems: form Component to Heterogenous System	2EL5090	2,5	Metz	F
□	□	Traitement de l'image	Digital Image Processing	2EL5070	2,5	Metz	F
□	□	La lumière pour comprendre la matière	Using Light to understand Matter	2EL5110	2,5	Metz	E
□	□	Architecture des ordinateurs	Computer architecture	2EL6020	2,5	Rennes	F
□	□	Modélica et bond graph: modélisation multi-domaine, analyse et simulation	Modelica and bond graph: multidomain modellisation, analysis ans simulation	2EL6050	2,5	Rennes	E
□	□	Economie de l'innovation	Economy of Innovation	2EL6160	2,5	Rennes	F
ELECTIVE SERIES 2.2							
Choice 1	Choice 2	FR Course title	Eng Course title	Course Code	ECTS	Campus	Language of Instruction
□	□	Transferts thermiques	Heat transfer	2EL1410	2,5	Paris Saclay	E
□	□	Génie logiciel orienté objet	Object oriented programming	2EL1520	2,5	Paris Saclay	F
□	□	Modèles et systèmes pour la gestion de données massives	Big Data management	2EL1560	2,5	Paris Saclay	F
□	□	Machine learning	Machine Learning	2EL1730	2,5	Paris Saclay	E
□	□	Vibration structurelle et acoustique	Structural vibration and acoustics	2EL1810	2,5	Paris Saclay	E
□	□	Physique quantique et statistique (part II)	Quantum and Statistical Physics part II	2EL1920	2,5	Paris Saclay	F
□	□	Theorie des Organisations et des marchés	Organisational and market theories	2EL2220	2,5	Paris Saclay	F
□	□	Finance et droit de l'entreprise	Corporate finance and Law	2EL2150	2,5	Paris Saclay	E + 1 lecture in F
□	□	Analyse et traitement de l'image	Analysis and audio file formatting	2EL5060	2,5	Metz	E
□	□	Modélisation pour l'ingénierie des systèmes	Modeling for Systems Engineering	2EL5140	2,5	Metz	F
□	□	Transitions et symbiose socio-économique	Transitions and socio-economic symbiosis	2EL5150	2,5	Metz	?
□	□	Conception de systèmes embarqués critiques de contrôle commande	Model based Design of Embedded Control Systems	2EL6010	2,5	Rennes	E
□	□	Méthodes numériques	Numerical Methods	2EL6080	2,5	Rennes	F
□	□	Nouveaux paradigmes réseau	New Network Paradigms	2EL6110	2,5	Rennes	F

□	□	Bayesian methods for machine learning	Méthodes bayésiennes pour l'apprentissage automatique	2EL6190	2,5	Rennes	F
ELECTIVE SERIES 2.3							
Choice 1	Choice 2	FR Course title	Eng Course title	Course Code	ECTS	Campus	Language of Instruction
□	□	Milieux réactifs	Reactive Media	2EL1440	2,5	Paris Saclay	E
□	□	Calcul haute performance	High Performance Computing	2EL1550	2,5	Paris Saclay	F
□	□	Probabilités avancées	High level Probabilities	2EL1710	2,5	Paris Saclay	F
□	□	Comportement non-linéaire des matériaux	Non-linear behaviour of materials	2EL1830	2,5	Paris Saclay	E
□	□	Génomique et biologie synthétique en biotechnologie sanitaire et industrielle	Genomics and synthetic biology in health and industrial biotechnology	2EL2030	2,5	Paris Saclay	E
□	□	Science de la conception	Design Science	2EL2120	2,5	Paris Saclay	E
□	□	Stratégie, Marketing et Organisation	Marketing Strategy and Organisation	2EL2140	2,5	Paris Saclay	F
□	□	Compression et débruitage des signaux	Signal compression and denoising	2EL2410	2,5	Paris Saclay	F
□	□	Architecture et conception des systèmes numériques	Architecture and design of digital systems	2EL2510	2,5	Paris Saclay	F
□	□	Théorie des communications	Theory of communications	2EL2610	2,5	Paris Saclay	E
□	□	Introduction à l'ingénierie des applications mobiles	Introduction to engineering of Mobile App	2EL5010	2,5	Metz	F
□	□	Méthodes d'estimations et introduction à la théorie moderne du codage	Estimation methods and introduction to modern theory of coding	2EL5050	2,5	Metz	F
□	□	Intelligence artificielle et deep learning	Artificial Intelligence and Deep Learning	2EL6090	2,5	Rennes	E
□	□	Communication Systems Engineering	Communication Systems Engineering	2EL6100	2,5	Rennes	E
□	□	Marketing Digital	Digital Marketing	2EL6180	2,5	Rennes	F

ENSEIGNEMENTS HORS SEQUENCE / SEMESTER-LONG COURSES							
Multiple choices possible		FR Course title	Eng Course title	Course code	ECTS	Campus	Language of Instruction
□ E	□ F	Economie	Economics	2SL1000	2	all	E or F in P-Saclay, F in Metz and Rennes
□ E	□ F	Science du Climat et enjeux du changement climatique	Climate science and climate change issues	2SL1100	0	all	E or F
□		Droit	Law	2SL2000	1	all	F in Metz, E in Paris-Saclay and Rennes
□		Sociologie des Organisations	Sociology of Organizations	2SL4000	1	all	F
□		Ateliers Pratiques Ingénieur - API	Engineering Skills Workshops	2SL5000	1	all	F
□		Ateliers Pratique Professionnelle - APP	Professional Practice Workshops	2SL7000	0,5	all	F
□		Sport	Sports	2SL9000	0	all	N/A
□		Projet S7	S7 Project	2SL8000	4,5	all	F/E depending on topic or group

INTENSIVE SEMINAR COURSES							
Choice		FR Course title	Eng Course title	Course code	ECTS	Campus	Language of Instruction
□		Jeux d' Entreprise	Business Games	2IN4000	2,5	all	F
Choice 1	Choice 2	FR Course title	Eng Course title	Course code	ECTS	Campus	Language of Instruction
□	□	Cours de type Sciences Humaines et Sociales (SHS) dans l'un de ces 4 domaines: Individus, Travail, Organisations; Enjeux de société; Science, Technologie, Société* ou Innovation, Arts et Créativité*	Humanities and Social Sciences (SHS) course, in one of the following domains: Individual, Work and Organisation; Perspective on key social issues; Science, Technology, Society* or Innovation, Arts and Creativity*	2IN2310, 2IN2320, 2IN2330, 2IN2340	1,5	Paris Saclay, Rennes	F or E depending on course
□	□	Design your way	Design your way	2EL2710	2,5	Paris Saclay	F
□	□	Comprendre la blockchain	Understanding Blockchain	2IN1510	2,5	Paris Saclay	F
□	□	Intelligence artificielle et santé mondiale	Artificial intelligence and global health	2IN1580	2,5	all	E
□	□	Communiquer sur des projets de recherche durable	Communicating sustainable research projects	2IN2100	2,5	Paris-Saclay	F
□	□	Bridge Building Challenge	Bridge Building Challenge	2IN5010	2,5	Paris-Saclay	F
□	□	Innovation des semi-conducteurs	Semiconductor innovation	2IN5020	2,5	Paris-Saclay	F
□	□	Travail expérimental de physique	Experimental physics work	2IN5030	2,5	Paris-Saclay	F
□	□	Enseignement expérimental en transmission d'information	Experimental work about information transmission	2IN5040	2,5	Paris-Saclay	F
□	□	Marketing	Marketing an its tools: towards responsible marketing?	2IN5106	2,5	Metz	F

LANGUAGE COURSES						
Choices (max. 2)	FR Course title	Eng Course title	Course code	ECTS	Campus	Language of Instruction
□	Anglais	English	2LC0100	1,5	all	N.A
□	Français Langue Etrangère - FLE	French as a foreign language	2LC0200	1,5	all	N.A
□	Allemand	German	2LC0300	1,5	all	N.A
□	Espagnol	Spanish	2LC0400	1,5	all	N.A
□	Italien	Italian	2LC0500	1,5	all	N.A
□	Portugais	Portuguese	2LC0600	1,5	Paris-Saclay	N.A
□	Chinois	Chinese	2LC7000	1,5	all	N.A
□	Japonais	Japanese	2LC0800	1,5	all	N.A
□	Russe	Russian	2LC0900	1,5	P-Saclay and Metz	N.A
□	Arabe	Arabic	2LC1000	1,5	P-Saclay and Rennes	N.A
□	Hébreu	Hebrew	2LC1200	1,5	P-Saclay	N.A