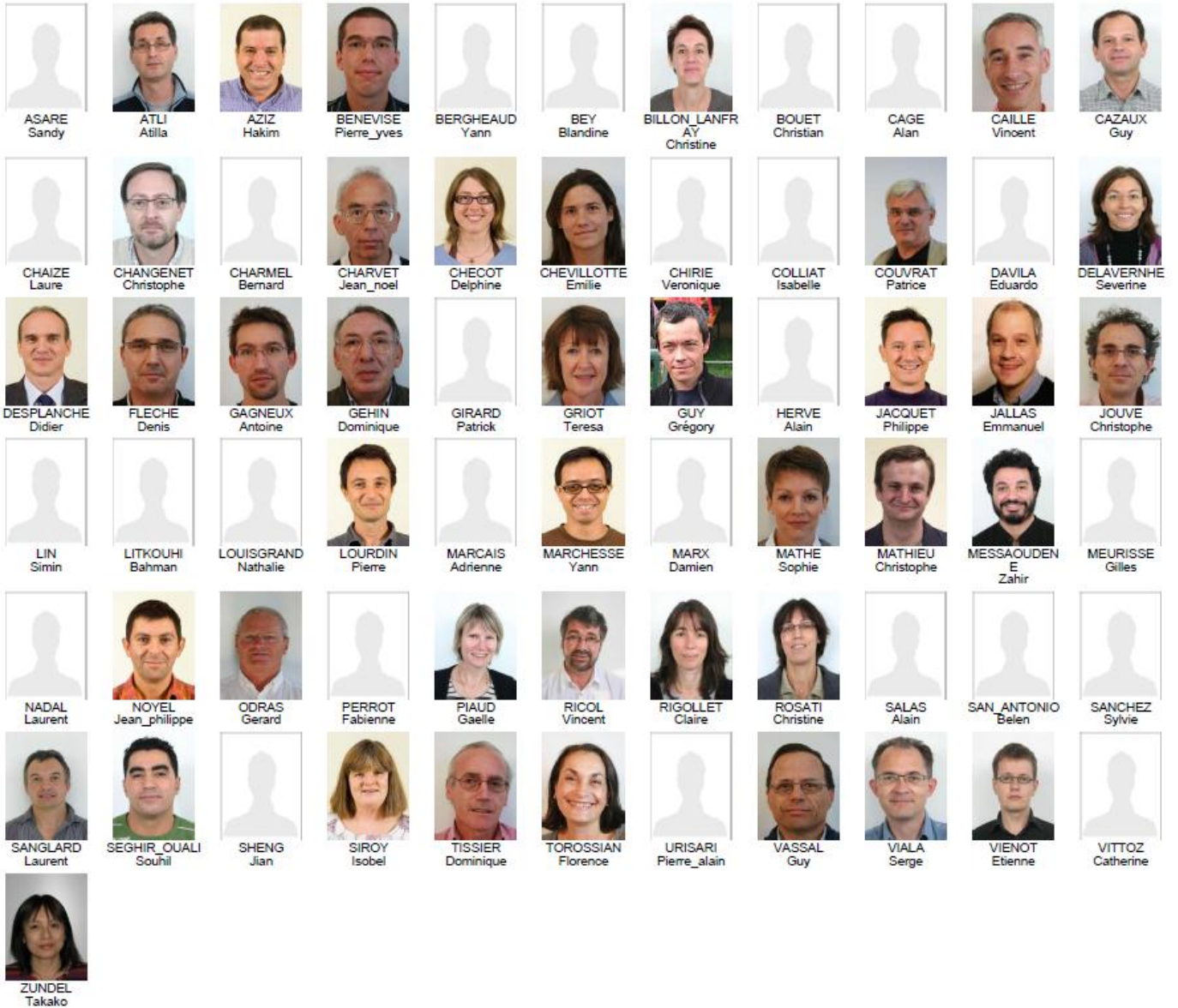


# ***ECAM MASTER'S OF ENGINEERING DEGREE DESCRIPTION OF STUDY PROGRAMME***





## ECAM Teachers





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## General organisation of studies

ECAM Master's of Engineering Degree is conferred after five years of tertiary studies: 300 ECTS Credits

	<b>3<sup>rd</sup> year of Engineering school – ECAM 5</b> (option of 1 year of double degree studies in a foreign university)	
Semester 9 Academic or 5 month Final engineering internship in France or abroad	5 month Final engineering internship in France or abroad	Semester 10 or Academic
<b>Optional Year “Young Engineer in industry”</b>		
	<b>2<sup>nd</sup> year of Engineering school – ECAM 4</b> (option of one year or one semester of studies in a foreign university)	
Semester 7		Semester 8
<b>“Application” Internship (4 months in France or abroad)</b>		
	<b>1<sup>st</sup> year of Engineering school – ECAM 3</b>	
Semester 5		Semester 6
<b>Compulsory industrial work placement (1 month)</b>		
	<b>2<sup>nd</sup> year of Preparatory classes – ECAM 2</b>	
Semester 3		Semester 4
<b>Optional industrial work placement (1 month)</b>		
	<b>1<sup>st</sup> year of Preparatory classes – ECAM 1</b>	
Semester 1		Semester 2
Scientific High School Degree (“Baccalauréat”)		

## Integrated Preparatory Classes

They are based on official preparatory class programs and also on courses specific to the ECAM training.

There are three fields of studies: scientific teaching, engineering sciences and communication skills. Emphasis is put on acquiring knowledge and know-how, with educational methods based on understanding and development of knowledge by the students.

I. Passing from one year to the next and then onto the Engineering studies depends on results received in continuous written and oral assessment.

### ECAM 1 - 1<sup>st</sup> year Preparatory Classes: Semesters 1 and 2

#### SCIENTIFIC TEACHING

**Mathematics:** (190 h. classes, 130 h. tutorials, 15 h. oral exams) – General calculation and logic skills – Linear algebra and applications to geometry and analysis – Elementary real analysis techniques.

**Physics and chemistry:** (130 h. classes, 60 h. tutorials, 75 h. lab. work, 15 h. oral exams)

**Physics:** Electro-kinetics – Electro-magnetism – Mechanics – Thermodynamics – Optics.

**Chemistry:** Reactions in aqueous solutions – Condensed matter – Chemical thermodynamics – Chemical kinetics – Atomic structure.

**Computer Science:** (15 h. classes, 34 h. lab. work) – Algorithms – Programming.

#### ENGINEERING SCIENCES (including 18 h. oral exams)

**Mechanical construction:** (32 h. classes, 130 h. tutorial, 16 h. project) – Static – Mechanical design.

**Automatic systems:** (20 h. class, 20 h. tutorial) – Boolean algebra – Binary logic.

**Production methods:** (16 h. class, 20 h. lab work) – Conventional and Numerical control machine tools.

#### II. COMMUNICATION SKILLS

**French + Communication:** (70 h. class, 60 h. tutorial) – Literature, philosophy, oral and written expression.

**Foreign language** (50 h. classes+ tutorial)

**PLURIDISCIPLINARY SCIENTIFIC PROJECT** (35 h.)

**SPORT** (60 h.)

**INDUSTRIAL WORK PLACEMENT** (optional, 1 month)

## ECAM 2 - 2<sup>nd</sup> year Preparatory Classes: Semesters 3 and 4

### III. SCIENTIFIC TEACHING

**Mathematics:** (160 h. classes, 80 h. tutorials, 12 h. oral exams) – Revision and extension of analysis – Several real variable vector functions – Linear algebra – Matrix calculations – Euclidian geometry – Integral and numerical series – Fourier series.

**Physics and chemistry:** (110 h. classes, 50 h. tutorials, 72 h. lab. work, 12 h. oral exams).

**Physics:** Scalar waves – Geometric and physical optics – Electrostatic and magneto-static vacuums – Magnetism in the presence of matter – Electro-magnetic induction – Maxwell's equations – Electro-magnetic waves – Electronics Thermodynamics.

**Chemistry:** Chemical equilibrium.

**Computer Science:** (34 h. lab. work) – Spreadsheets – VBA programming.

**ENGINEERING SCIENCES** (including 17 h. oral exams)

**Mechanical construction:** (20 h. classes, 82 h. tutorials, 24 h. project) – Structural mechanics – Solid mechanics Mechanical design.

**Automatic systems:** (28 h. classes, 12 h. tutorials) – Invariable continuous linear systems.

**Production methods:** (6 h. classes, 17 h. lab. work, 17 h. in Methods office) before production launch project.

### IV. COMMUNICATION SKILLS

**French + Communication** (50 h. classes, 15 h. tutorials) – Literature – Philosophy – Oral and written expression.

**Foreign language** (50 h. classes + tutorials).

**PLURIDISCIPLINARY SCIENTIFIC PROJECT** (35 h.)

**SPORT** (60 h.)

**Entry into the Engineering school validates 120 ECTS credits from Preparatory classes.**

### Summary of Preparatory Classes

V. N° of hours	Classes	Tutorial Work	Laboratory Work	Project Work	Total supervised work	Work placement
1 <sup>st</sup> year prep classes	498	425	129	51	1103	4 weeks
2 <sup>nd</sup> year prep classes	399	264	123	91	877	

# **ECAM 3 ENGINEERING SCHOOL SEMESTER 5**



## ECAM 3 – SEMESTER 5

### LIST OF PROGRAMME UNITS

N°	Programme units	Person in Charge	CREDITS	Title	Teaching units
<b>1</b>	<b>5S UP1</b>	<b>Antoine GAGNEUX</b>	<b>5</b>	<b>MATHEMATICS AND IT</b> Statistics and Mathematics IT	5S UP1 UE1 5S UP1 UE2
<b>2</b>	<b>5S UP2</b>	<b>Serge VIALA</b>	<b>8</b>	<b>MECHANICS AND MATERIALS</b> Strength of materials Materials science	5S UP2 UE1 5S UP2 UE2
<b>3</b>	<b>5S UP3</b>	<b>Christine BILLON-LANFRAY</b>	<b>5</b>	<b>MECHANICAL DESIGN 1</b> General Mechanics Mechanical Design	5S UP3 UE1 5S UP3 UE2
<b>4</b>	<b>5S UP4</b>	<b>Jean Noël CHARVET</b>	<b>6</b>	<b>ELECTRICITY AND AUTOMATION</b> Electricity Automation	5S UP4 UE1 3A 5S UP4 UE2
<b>5</b>	<b>5S UP5</b>	<b>Teresa GRIOT</b>	<b>1</b>	<b>LANGUAGES 1</b> English Optional Second Language	5S UP5 UE1 (5S UP5 UE2)
<b>6</b>	<b>5S UP6</b>	<b>Gaëlle PIAUD</b>	<b>5</b>	<b>CAD AND ORGANISATION OF PRODUCTION</b>	

Each programme unit consists of one or several teaching units. The credits are attributed to programme units. Depending on the subject, the teaching units include lectures, small group work, practical work, projects, and case studies...


Teaching language:


**The practical work experience is carried out between semesters 4 and 5 and the evaluation is carried out during semester 5**

<b>Code :</b> 5S UP1	<b>MATHEMATICS AND INFORMATION TECHNOLOGY</b>	<b>Level :</b> L3
<b>Year :</b> 3 <b>Semester :</b> 6		<b>ECTS Credits :</b> 5
<b>Teaching Units :</b> > 5S UP1 UE1 : <b>STATISTICS AND MATHEMATICS</b> > 5S UP1 UE2 : <b>IT</b>		<b>Teaching Language :</b> French
<b>Teacher in Charge :</b> Antoine Gagneux		
<b>Teachers :</b> Pierre-Yves Bénévisse Antoine Gagneux	<b>Subjects :</b> Mathematics et statistics IT	
<b>Evaluation :</b>	- 2 mathematics exams - 1 IT exam - 1 IT practical work mark	<b>Coefficients :</b> 1 (x 2) 1 1
<b>Prerequisite :</b> Knowledge in mathematics acquired in scientific preparatory classes, introduction to IT.		
<b>Skills acquired:</b> <ul style="list-style-type: none"> <li>• Ability to apply statistical tools in the field of industry (organising and controlling production and physics (Signal processing) by using IT tools which will be covered in the following programme units: mechanics, acoustics, automation and industrial engineering.</li> <li>• Knowledge of an IT programming language and practical skills in programming in this language (JAVA).</li> <li>• Ability to design an IT programme, from modelisation in UML and OOP to JAVA language, through algorithms.</li> </ul>		
<b>Content :</b> <p><b>1. Mathematics and statistics</b></p> <p>Probability: random variables – Common laws of probability.          Statistics : sampling, estimations, hypothesis testing on bias and independence, experiment design and survey sampling          Object-oriented Signal processing– Fourier transforms</p> <p><b>2. IT:</b></p> <p>Algorithms and data structures - Object-oriented Programming (OOP)– JAVA language.</p>		

<b>Code :</b> 5S UP3	<b>MECHANICS AND MATERIALS</b>	<b>Level :</b> L3
<b>Year :</b> 3 <b>Semester :</b> 5		<b>ECTS Credits :</b> 8
<b>Teaching Units :</b> ➤ 5S UP2 UE1 : <b>STRENGTH OF MATERIALS</b> ➤ 5S UP2 UE2 : <b>MATERIALS SCIENCE</b>		<b>Teaching Language :</b> French
<b>Teacher in charge :</b> Serge Viala		
<b>Teachers :</b> Serge Viala Yann Marchesse Pierre Lourdin Philippe Jacquet	<b>Subject :</b> Strength of Materials Strength of Materials Materials Science Materials Science	
<b>Evaluation :</b>	<ul style="list-style-type: none"> <li>- 3 Strength of Materials written exams</li> <li>- 1 Strength of Materials oral exam</li> <li>- 2 Materials Science written exams</li> <li>- 1 practical work mark in Materials</li> <li>- 1 practical work mark in Mechanics</li> </ul>	<b>Coefficient</b> 1 (x 3) 1,5 1 (x 2) 0,5 0,5
<b>Prerequisite :</b> Statistics and strength of materials preparatory classes 1 <sup>st</sup> and 2 <sup>nd</sup> years. Basic knowledge of inorganic and organic chemistry		
<b>Skills acquired :</b> The engineer wanting to define the features of a system (parts of a machine or construction elements), must work through a series of fundamental steps. <ul style="list-style-type: none"> <li>• Choosing the necessary materials to make a product: Choice of materials used to make the product, taking into account the constraints regarding environment (temperature, atmosphere, mechanics...) and also aesthetics, costs, implementation, recycling...</li> <li>• Modelling the behaviour under load and checking the strength: applying laws of mechanics and behaviour of materials. This step must guarantee the respect of the load limit, imposed by the standards according to the intrinsic characteristics of materials. The mechanics and materials programme unit allow the "arts et metier" (multidisciplinary) engineer to approach these two complementary steps in the 2 following Teaching Units:</li> </ul> <ul style="list-style-type: none"> <li>- Strength of materials</li> <li>- Materials science</li> </ul>		
<b>Content :</b> <ol style="list-style-type: none"> <li><b>1. Strength of materials :</b> Engineer's Beam Theory and simple and compound bending to which materials are submitted – Calculations of deflections – Linear and plastic behaviour of materials – Buckling – Criteria – Eurocode 3 standard</li> <li><b>2. Materials science :</b> Crystallography – mechanical tests: strain hardening, dislocation – Thermal treatments: soaking and hardening – Polymers: relationship between structures and properties Composites: fibres and matrices, design considerations, properties.</li> </ol>		

<b>Code :</b> 5S UP3	<b>MECHANICAL DESIGN 1</b>		<b>Level :</b> L3
<b>Year :</b> 3 <b>Semester :</b> 5			<b>ECTS Credits :</b> 5
<b>Teaching Units :</b> > 5S UP3 UE1 : <b>GENERAL MECHANICS</b> > 5S UP3 UE2 : <b>MECHANICAL DESIGN</b>		<b>Teaching Language :</b> French	
<b>Teacher in charge :</b> Christine BILLON-LANFRAY			
<b>Teachers :</b> Vincent Caillé Serge Viala Christine Billon-Lanfray	<b>Subject :</b> General Mechanics Small group work in Mechanics Mechanical Design		
<b>Evaluation :</b>	- 2 written exams in general mechanics - 1 oral exam in general mechanics - 1 small group mechanics project mark - 2 Mechanical Design project marks	<b>Coefficient</b> 1 (x 2) 1 1 2	
<b>Prerequisite :</b> Knowledge of preparatory class programme in engineering science (dynamics, mechanical construction)			
<b>Skills acquired :</b> This Programme Unit is complementary to Programme Unit2. It builds basic skills for an engineer working in a design office, including skills necessary in mechanical fabrication (machining, metrology) so as to be able to carry out the design of simple devices (design and stimulation, including dynamics) and their fabrication.			
<b>Content :</b>			
<p><b>1. General Mechanics :</b>          Kinematics – Kinetics – Dynamics          Fundamental principle of dynamics applied to a system          Shocks          Lagrange Equations – Lagrange Multiplier          Numerical problem-solving methods – Simulation (ADAMS code)</p> <p><b>2. Mechanical Design :</b>          Mechanical bonding:          Proportioning          Lubrication – bearings</p> <p><b>3. CAM</b></p>			

<b>Code</b> : 5s up4		<b>ELECTRICITY AND AUTOMATION</b>			<b>Level</b> : L3	
<b>Year</b> : 3					<b>ECTS Credits</b> : 6	
<b>Semester</b> : 5						
<b>Subtitles/ Objectives</b> :						
General electricity, electrical installations and automated installations						
<b>Teaching Units</b> :				<b>Teaching Language</b> :		
> 5S UP4 UE1 : <b>ELECTRICITY</b> > 5S UP4 UE2 : <b>AUTOMATION 1</b>				French		
<b>Teacher in charge</b> :						
Jean-Noël Charvet						
<b>Teachers</b> :			<b>Subject</b> :			
Dominique Tissier Guy Vassal Jean-Noël Charvet			Electricity Electrical measurements Automation			
<b>Evaluation</b> :					<b>Coefficients</b>	
			- 3 electricity written exams - 1 mark for practical work in electricity - 1 automation written exam - 1 mark for practical work in automation - 1 oral exam in electricity		1,5 (x 3) 1 1 1 2	
<b>Prerequisite</b> :						
Physics, automation and mathematics lessons in preparatory classes (semesters 1, 2, 3 & 4).						
<b>Skills acquired</b> :						
<ul style="list-style-type: none"> <li>• Understanding the physics of everyday electrical devices.</li> <li>• Knowledge of methods and rules of calculating electrical circuits and principles of electrical measurements.</li> <li>• Knowledge of the technical vocabulary about electrical equipment and automatic systems</li> <li>• Ability to measure and choose an electrical component or device in everyday or new electrical engineering applications.</li> <li>• Knowledge of the fundamentals linked to the design of logical and digital systems</li> <li>• Knowledge of methods of analysing an automatic system and the criteria for choosing Industrial Programmable Robots. Ability to write specifications.</li> </ul>						
<b>CONTENT</b> :						
<ol style="list-style-type: none"> <li><b>1. Electricity</b></li> <li><b>2. Electrical measurements</b></li> <li><b>3. Automation</b></li> </ol>						
<b>Teaching approach : Classes and PW</b>						
<b>Activity</b>	<b>Staff-members in charge</b>	<b>Type</b>	<b>Duration</b>	<b>/week</b>	<b>Evaluation</b>	
PW	Guy Vassal Guy.vassal@ecam.fr	PW	12		R	
Classes	Dominique Tissier Dominique.tissier@ecam.fr	L	44		W	
Classes	Jean-Noël Charvet	L	14		W	
PW	Jean-noel.charvet@ecam.fr	PW	16		R+W	

<b>Code :</b> 5S UP5	<b>LANGUAGES 1</b>		<b>Level :</b> L3
<b>Year :</b> 3 <b>Semester :</b> 5			<b>ECTS Credits :</b> <b>+ Stage :</b> 3
<b>Teaching Units :</b> ➤ 5S UP5 UE1: <b>ENGLISH</b> ➤ 5S UP5 UE2: <b>SECOND LANGUAGE</b>		<b>Teaching Language :</b> English	
<b>Teacher in charge :</b> Teresa Griot			
<b>Teachers :</b> Teresa Griot Emilie Chevillotte Florence Torrossian Belen San Antonio Blandine Bey Isobel Siroy Krystyna Knight Joëlle Convert  Christian Bouet Simin Lin Isabelle Colliat Takako Zundel		<b>Subject :</b> English English English English English English English English  <i>2<sup>nd</sup> Language :</i> German Chinese Spanish Japanese	
<b>Evaluation :</b>		- 1 oral in English - 1 English tutorial exam	<b>Coefficients</b> 1 1
<b>Prerequisite :</b>		<b>Comments :</b> Optional credit for a second language: 1	
<b>Skills acquired :</b>  <ul style="list-style-type: none"> <li>• Basic skills in written and oral comprehension and written and oral expression in English</li> <li>• Drafting a CV in preparation to researching a traineeship</li> </ul>			
<b>Content :</b>  Conversation, writing documents, preparing oral presentations			

<b>Code</b> : 5S UP6	<b>CAD AND ORGANISATION OF PRODUCTION</b>	<b>Level</b> : L3
<b>Year</b> : 3 <b>Semester</b> : 5		<b>ECTS Credits</b> : 5
		<b>Teaching Language</b> : French
<b>Teacher in charge</b> : Gaëlle PIAUD		
<i>TEXT PENDING</i>		

# **ECAM 3 ENGINEERING SCHOOL SEMESTER 6**


## ECAM 3 - SEMESTER 6


### LIST OF PROGRAMME UNITS

N°	Programme units	Person in charge	CREDITS	Title	Teaching Units
1	6S UP1	Vincent CAILLE	8	<b>ENERGY SYSTEMS 1</b> Fluid Mechanics Thermodynamics	6S UP1 UE1 6S UP1 UE2
2	6S UP2	Jean-Philippe NOYEL	6	<b>MATERIALS AND STRUCTURAL ANALYSIS</b>	6S UP2 UE1 6S UP2 UE2
3	6S UP3	Abdelhakim AZIZ	4	<b>INDUSTRIAL ENGINEERING</b> Mechanical Design Industrial organisation Methods and production	6S UP3 UE1 6S UP3 UE2 6S UP3 UE3
4	6S UP4	Dominique TISSIER	2	<b>ELECTRICAL ENGINEERING AND AUTOMATION</b> Electrical Engineering Automation 2	6S UP4 UE1 6S UP4 UE2
5	6S UP5	Antoine GAGNEUX	4	<b>IT PROJECT</b>	6S UP5 UE1
6	6S UP6	Sophie MATHE	3	<b>INTERPERSONAL SKILLS TRAINING AND COMMUNICATION</b> Interpersonal Skills Training English Optional Second Language	6S UP6 UE1 6S UP6 UE2 (6S UP6 UE3)
7	6S UP7	Gaëlle PIAUD	3	<b>CAD AND ORGANISATION OF PRODUCTION</b>	6S UP7 UE1 6S UP7 UE2 6S UP7 UE3

Each programme unit consists of one or several teaching units. The credits are attributed to programme units. Depending on the subject, the teaching units include lectures, small group work, practical work, projects, case studies...

Unless otherwise specified on the teaching unit sheets, teaching is in French.


<b>Code</b> : 6S UP1	<b>ENERGY SYSTEMS 1</b>		<b>Level</b> : L3
<b>Year</b> : 3 <b>Semester</b> : 6			<b>ECTS Credits</b> : 8
<b>Teaching Units</b> :		<b>Teaching Language</b> :	
<ul style="list-style-type: none"> <li>➤ 6S UP1 UE1 : <b>FLUID MECHANICS</b></li> <li>➤ 6S UP1 UE2 : <b>THERMODYNAMICS</b></li> </ul>		French	
<b>Teacher in charge</b> : Vincent Caillé			
<b>Teachers</b> :		<b>Subject</b>	<b>Duration</b> : 109 h
Vincent Caillé		Fluid Mechanics	
Souhil Seguir-Ouali		Thermodynamics	
Christophe Changenet			
<b>Evaluation</b> :	<ul style="list-style-type: none"> <li>- 2 fluid mechanics written exams</li> <li>- 1 fluid mechanics oral exam</li> <li>- 2 thermodynamics written exams</li> <li>- 1 thermodynamic oral exam</li> <li>- 1 hydraulics practical work mark</li> </ul>		<b>Coefficients</b> :
			1 (x2)
			1
			1 (x2)
			1
			1
<b>Prerequisite</b> :			
Preparatory school classes in mathematics, mechanics and thermodynamics			
<b>Skills acquired</b> :			
Controlling energy consumption as well as developing renewable and low pollution sources is a major challenge for engineers in the years to come.			
The aim of the "Energy Systems 1" Programme Unit is to present tools and methods to the students, enabling them to acquire skills in industrial system energy sizing (or preliminary sizing).			
Two complementary steps are taken into account:			
1- An introduction and a technical study on the main driving and driven machines based on fluid transformations (internal combustion engine, compressor, gas turbine, refrigerating unit...)			
2- An introduction to modelling techniques of fluid dynamic and energy behaviours. This step contributes not only to the acquisition of skills about how the above machines work, but also to the calculation of energy dissipations associated with motorised systems (aerodynamics, industrial hydraulics...).			
<b>Content</b> :			
<b>1. Fluid Mechanics :</b>			
Presenting the different types of fluids and flows			
Fluid kinematics			
Mass, momentum and energy equations			
Euler, Navier-Stokes and Bernoulli equations and where they can be applied			
Head losses and boundary layer			
Dimensional analysis – Similarity conditions			
Drag and lift forces – aeronautical applications			
<b>2. Thermodynamics :</b>			
- First and second laws			
- Positive displacement compressors and turbo-compressors			
- Refrigerating units and heat pumps			
- Internal combustion engine			
- Gas turbine			
- Steam driven installations			

<b>Code</b> : 6S UP2	<b>MATERIALS AND STRUCTURAL ANALYSIS</b>		<b>Level</b> : L3
<b>Year</b> : 3 <b>Semester</b> : 6	<b>Compulsory</b> Optional	<b>Type</b> : L+PW	<b>ECTS Credits</b> : 6
<b>Subtitles/ Objectives</b> : <b>THEORY OF ELASTICITY AND FINITE ELEMENT METHOD</b> Acquire basic knowledge in elasticity and the finite element method. Able to make (or to have made) a finite element analysis: choosing the type of elements, defining boundary conditions, choosing which option to use to solve the problem; interpreting the results. Recognise the source of errors on finite element analysis and understand the influence of the choice of modelling on the results obtained.			
<b>Duration (number of allocated hours)</b> : 87			<b>Teaching Language</b> : French
<b>Teacher in charge</b> : Jean-Philippe NOYEL			
<b>Teachers</b> :		Patrice Couvrat Claire Rigollet Jean-Philippe Noyel	
<b>Evaluation</b> :	<ul style="list-style-type: none"> <li>- 2 exams</li> <li>- 1 Structural Calculation oral exam</li> <li>- 1 mechanical group assignment mark</li> <li>- 1 materials written exam</li> <li>- 1 materials practical work mark</li> </ul>		<b>Coefficients</b> : 1 (x2) 1 1 1 1
<b>Prerequisite</b> : Materials strength courses - Year 3, Semester 5			
<b>Skills acquired</b> :			
<ul style="list-style-type: none"> <li>- Knowledge of the concepts of strains and stresses : Physical significance, difference deformation-displacement ; difference shear stress-normal stress, existence of criteria, unities</li> <li>- Knowledge of hypothesis about linear elasticity, small strains and material linearity (Hooke Law).</li> <li>- Capable of resolving a simple problem about elasticity</li> <li>- Basic knowledge about the Finite Element Method</li> <li>- Know how to choose a model and carry out a FEA</li> </ul>			
<b>Content</b> :			
Elasticity:			
<ul style="list-style-type: none"> <li>o Deformations : Lagrange transformation, small strain tensor</li> <li>o Stresses</li> <li>o Material behavior, linear elasticity</li> <li>o Analytical Resolution: displacement formulations, Lamé Clapeyron equations.</li> </ul>			
Finite Element Method:			
<ul style="list-style-type: none"> <li>o Energy method : virtual work's principle; strain energy; Ritz method</li> <li>o Principles of the Finite Element Method</li> <li>o Type of elements: link, beam, solid 2D and shell</li> <li>o Nonlinear analysis: geometric nonlinearities and material nonlinearities : elastoplastic behavior</li> <li>o ANSYS software practical work.</li> </ul>			

**Bibliography :**  
 Imbert, J.F., **Analyse des structures par éléments finis**, (Structural analysis by finite elements)  
 Cepadues Editions, 2<sup>ème</sup> édition  
**CRAVEUR, J.C.**, *Modélisation des structures, Calcul par éléments finis*, Dunod [Modeling structures, Finite Elements Analysis]  
**ZIENKIEWICZ, O.C.**, The Finite Element Method, McGraw-Hill


Activity	Teaching Staff member in charge	Duration	/week	Evaluation
SG	Jean-Philippe Noyel	16	1	3 R
L	Jean-Philippe Noyel	59		
PW	Philippe Jacquet	12		
	Jean-philippe.noyel@ecam.fr			

<b>Code</b> : 6S UP3	<b>INDUSTRIAL ENGINEERING</b>	<b>Level</b> : L3
<b>Year</b> : 3 <b>Semester</b> : 6		<b>ECTS Credits</b> : 4
<b>Teaching Units :</b> > 6S UP3 UE1 : <b>MECHANICAL DESIGN: POWER TRANSMISSION</b> > 6S UP3 UE2 : <b>INDUSTRIAL ORGANISATION</b> > 3A 6S UP3 UE3 : <b>METHODS AND PRODUCTION</b>		<b>Teaching Units :</b> French
<b>Teacher in charge</b> : Abdelhakim Aziz		
<b>Teachers :</b> Christine Billon-Lanfray Abdelhakim Haziz Denis Fleche Gaëlle Piaud Christine Rosati	<b>Subject :</b> Mechanical design Methods and Production Forming processes Industrial organisation	
<b>Evaluation :</b>	Written exam + Project about mechanical design Project about methods Applied mathematics written exam	<b>Coefficients :</b> 2 2 1
<b>Prerequisite:</b> Programme units 2 and 3 from 5 <sup>th</sup> semester.		
<b>Skills acquired :</b> The skills acquired in the Programme units in « Mechanics and Materials » and « Mechanical Design 1 » of the previous semester are applied to mechanical power transmissions. This is from the point of view of the mechanical industry including design of complex devices such as power transmissions, the methods and organisation, processing raw materials, manufacturing and controlling the finished parts; including machining with numerical control machines. Developing the ability to justify technical choices that have been made. Industrial organisation : (text pending)		
<b>Content :</b> <ol style="list-style-type: none"> <li><b>1. Mechanical Design:</b> Power transmissions: gearing systems, belts, hydrostatics, pumps and hydrostatic engines. Pumps and hydraulic engines Adjustment, controlling technical data</li> <li><b>2. Industrial organisation:</b> (text pending)</li> <li><b>3. Methods and production and shaping processes :</b> Procedures for processing and working on plastic and metallic material. CAM approach, file transmission, cutting conditions, machining stimulations Machining dispersions – three-dimensional control Control procedures</li> </ol>		

<b>Code :</b> 6S UP4	<b>ELECTRICAL ENGINEERING AND AUTOMATION</b>		<b>Level :</b> L3
<b>Year :</b> 3 <b>Semester :</b> 6			<b>ECTS Credits :</b> 2
<b>Teaching Units :</b> ➤ 6S UP4 UE1 : <b>ELECTRICAL ENGINEERING</b> ➤ 6S UP4 UE2 : <b>AUTOMATION 2</b>		<b>Teaching Language :</b> French	
<b>Teacher in charge :</b> Dominique Tissier			
<b>Teachers :</b> Dominique Tissier Guy Vassal Jean-Noël Charvet	<b>Subject :</b> Electrical Engineering Electricity practical work Automation		
<b>Evaluation :</b>	- 1 practical work exam in automation - 1 mark for applied electricity small group assessment - 1 practical work mark in applied electricity	<b>Coefficients :</b> 1 0,5 2	
<b>Prerequisite :</b> Electrical engineering and automation classes and practical work from 5th semester			
<b>Skills acquired :</b> <ul style="list-style-type: none"> <li>• Know how to calculate common electrical installations</li> <li>• Know how to carry out measurements on power grids</li> <li>• Know how to read an electrical circuit diagram and master technical vocabulary about low voltage equipment</li> <li>• Know how to measure and choose an electrical component for everyday or new electrical engineering applications</li> <li>• Understand the background development of control systems (SCHNEIDER, SIEMENS, ROCKWELL), Supervising an industrial plant network</li> <li>• Be able to build elementary applications using Matlab</li> </ul>			
<b>Content :</b> <p><b>1. Applied electricity</b> Single-phase power grids, three-phase power grids, presentation of a national power plant grid from the power production plant to the distribution grid, common calculations. Transformers and "low voltage" electrical devices, electrical installation diagrams, risks, and protection. Methods and control gear on electrical grids</p> <p><b>2. Automation</b> <u>Practical project work - subjects as given :</u> Production line stock-handling Food production line Automated warehouse – stacking device Controlling a rail network Surface treatment line</p>			

*NB : as of October 2010 all the electro-technology teaching is moved to semester 5.*

<b>Code : 6S UP5</b>		<b>IT PROJECT</b>		<b>Level : L3</b>	
<b>Year : 3</b> <b>Semester : 6</b>		<b>Compulsory</b> Optional		<b>Type : L+PW+P</b> <b>ECTS Credits : 4</b>	
<b>Subtitles/ Objectives</b> Software engineering and IT project			<b>Teaching Language :</b> French		
<b>Teacher in charge :</b> Antoine GAGNEUX					
<b>Duration (number of allocated hours) :</b> 45			<b>Evaluation :</b> Project management Design Presentation		<b>Coefficient :</b> 1 1 1
<b>Teachers :</b> Antoine Gagneux Etienne Vienot Christophe Mathieu					
<b>Prerequisite :</b> Introduction to JAVA programming.					
<b>Skills acquired :</b> Knowledge about the management of an IT project Differentiating roles of software engineering and implementation. Understand the validation system in the management of an IT project. Carrying out software development on a small scale IT project. Analysing and setting up the structures of IT project management.					
<b>Content :</b> Lecture and Seminar from the head of an IT project, within a company as well as real examples illustrating the stages of the management of an IT project. Developing JAVA software: implementing tools for the management of an IT project (specifications, scheduling, requirements, modelling, development, testing and costing)					
<b>Activity</b> <b>Person in charge</b>	<b>Type</b>	<b>Duration</b>	<b>/week</b>	<b>Evaluation</b>	
Class Christophe Mathieu	<a href="mailto:christophe.mathieu@ecam.fr">christophe.mathieu@ecam.fr</a>	L	12		
Project Antoine Gagneux	<a href="mailto:antoine.gagneux@ecam.fr">antoine.gagneux@ecam.fr</a>	Project	22	R + Presentation	

<b>Code</b> : 6S UP6	<b>INTERPERSONAL SKILLS TRAINING AND COMMUNICATION</b>	<b>Level</b> : L3
<b>Year</b> : 3 <b>Semester</b> : 6		<b>ECTS Credits</b> : 3
<b>Teaching Units</b> : > 6S UP7 UE1: <b>INTERPERSONAL SKILLS TRAINING</b> > 6S UP7 UE2 : <b>ENGLISH</b> > 6S UP7 UE3: <b>SECOND LANGUAGE</b>		<b>Teaching Language</b> : French English
<b>Teacher in charge</b> : Sophie MATHE		
<b>Teachers</b> : Sophie Mathé Maurice Rochet Sylvie Sanchez-Forsans Pierre Rivière Sébastien Blanchet  Teresa Griot Emilie Chevillotte Florence Torrossian Belen San Antonio Blandine Bey Isobel Siroy Krystyna Knight Joëlle Convert  Christian Bouet Simin Lin Isabelle Colliat Takako Zundel	<b>Subject</b> CV and cover letters Entrepreneurial skills Psychology Feedback about internship Presentation of "The Company" Writing in French eLearning English English English English English English English English English English English German Chinese Spanish Japanese	
<b>Duration (number of allocated hours)</b> : <b>26h Interpersonal skills &amp; communication</b> <b>25h Languages</b>	<b>Evaluation</b> - Interpersonal Skills Training - 1 English written exam - 1 English oral exam - 1 TOEFL exam	<b>Coefficients</b> 2 1 1
<b>Comments</b> : Optional credit for a second language: 1		
<b>Skills acquired</b> : <ul style="list-style-type: none"> <li>• Improve written communications skills for prospecting internships</li> <li>• First awareness-raising about entrepreneurship</li> <li>• Discover theoretical principles and fundamental applications of psychology to build up self-awareness</li> <li>• Can analyze experience acquired during internships</li> <li>• Can understand how a company works and is structured</li> <li>• Perfecting or developing written and oral skills in English and in a second foreign language (optional)</li> </ul>		
<b>Content</b> : <ol style="list-style-type: none"> <li><b>1. Interpersonal skills training</b> :             <ul style="list-style-type: none"> <li>• CV and cover letter and different styles: content and presentation</li> <li>• Entrepreneurship</li> <li>• Theories of psychology in work environment</li> <li>• Presenting and analyzing internships collectively and individually</li> <li>• The company : how it works, how it is constituted</li> </ul> </li> <li><b>2. Language training</b>              Preparing reports and oral presentations           </li> </ol>		

<b>Code</b> : 6S UP7	<b>CAD AND ORGANISATION OF PRODUCTION</b>	<b>Level</b> : L3
<b>Year</b> : 3 <b>Semester</b> : 6		<b>ECTS Credits</b> : 5
		<b>Teaching Language</b> : French
<b>Teacher in charge</b> : Gaëlle PIAUD		
<i>TEXT PENDING</i>		

# **ECAM 4 ENGINEERING SCHOOL SEMESTER 7**

Code : 4A FP1	APPLICATION PLACEMENT	
<p><b>General Objectives</b></p> <p>The main aim of practical work experience is to enable an engineering student to discover and understand a company.</p> <p>After these traineeships, the student must be capable of integrating the company as an engineer in France or abroad. The student must evaluate his or her own abilities before taking up a job as an engineer in a professional field. The student will have had to prove his or her capacity to apply knowledge acquired at school, firstly at a level of a technician, then at an engineering level.</p> <p><b>The practical work experience :</b></p> <p>During the practical work experience, the engineer student will have to work in a department of a company, carrying out different tasks corresponding to his level of studies and which enable him or her to fulfil the four following objectives:</p> <ol style="list-style-type: none"> <li><b>1. Applying acquired knowledge</b></li> <li><b>2. Discovering professional relationships in the company</b></li> <li><b>3. Learning corporate culture</b></li> <li><b>4. Developing a professional project</b></li> </ol> <p><b>Duration :</b></p> <p>Four months between semester 6 and semester 7</p> <p><b>Either the practical work experience or the engineering internship or both must be carried out abroad.</b></p> <p><b>Traineeship preparation, supervision</b></p> <ul style="list-style-type: none"> <li>• <b>Preparing</b> Seminar on intercultural issues Developing job application skills, help in seeking internships</li> <li>• <b>Carrying out</b> Written report, report on cultural awareness in internships abroad, professional diary (*) (*) For each internship, this professional diary gathers the assessments of the internship supervisor, the student feedback and an internship interview evaluation (using internship assessment table)</li> <li>• <b>Learning from the experience/validating</b> Personal interview Exchanging experiences and seminars on intercultural issues</li> </ul> <p><b>The practical work experience must be validated to obtain the ECAM engineering degree (15 non-academic credits)</b></p> <p><b>The practical work experience is mentioned on the degree appendix</b></p>		

## ECAM 4 - SEMESTER 7


### LIST OF PROGRAMME UNITS

N°	Programme Units	Person in charge	CREDITS	Title	Teaching Units
1	7S UP1	<b>Christophe MATHIEU</b>	5	<b>OPERATIONAL RESEARCH</b>	7S UP1 UE1
2	7S UP2	<b>Christophe CHANGENET</b>	5	<b>ENERGY SYSTEMS 2</b> Applied Fluid Mechanics Heat Transfer	7S UP2 UE1 7S UP2 UE2
3	7S UP3	<b>Vincent RICOL</b>	3	<b>MECHANICAL DESIGN 2</b>	7S UP3 UE1
4	7S UP4	<b>Dominique GEHIN</b>	3	<b>AUTOMATION</b>	7S UP4 UE1
5	7S UP5	<b>Christophe JOUVE</b>	8	<b>ELECTRICAL ENGINEERING AND ELECTRONICS</b> Electronics Electrical Engineering	7S UP5 UE1 7S UP5 UE2
6	7S UP6	<b>Gaëlle PIAUD</b>	2	<b>INNOVATION PROJECT</b>	7S UP6 UE1
7	7S UP7	<b>Sophie MATHE</b>	3	<b>INTERPERSONAL SKILLS TRAINING AND COMMUNICATION 2</b> Optional Interpersonal Skills Training English Optional Second Language	7S UP7 UE1 7S UP7 UE2 (7S UP7 UE3)


Each programme unit consists of one or several teaching units. The credits are attributed to programme units. Depending on the subject, the teaching units include lectures, small group work, practical work, projects, case studies...

Unless otherwise specified on the teaching unit sheets, teaching is in French.


**The application placement is carried out between semesters 6 and 7  
Its evaluation is carried out during semester 7**


<b>Code</b> : 7S UP1	<b>OPERATIONAL RESEARCH</b>				<b>Level</b> : M1
<b>Year</b> : 4					<b>ECTS Credits</b> : 5
<b>Semester</b> : 1					
<b>Subtitles/ Objectives</b> :				<b>Teaching Language</b> :	
operational research; data structures ; graphical analysis ; queuing networks, sequencing, distribution networks, transport analysis, resource allocation				French	
<b>Teacher in charge</b> : Christophe MATHIEU					
<b>Teachers</b> :		Christophe Mathieu Antoine Gagneux			
<b>Duration (number of allocated hours)</b> : 48		<b>Évaluation</b> :		<b>Coefficient</b> :	
		Continuous assessment Oral		7 skills 3 skills	
<b>Prerequisite</b> :					
Know an object-oriented programming (OOP) language (preferably Java)					
<b>Skills acquired</b> :					
<ol style="list-style-type: none"> <li>1. Implement principal data structures (stacks, queues, trees, hash tables...).</li> <li>2. Understand the concepts of queuing, optimization, sequencing, flows, allocation, distribution and transport networks and their practical use.</li> <li>3. Know how to model and solve a real problem with graphs(queuing, distribution networks, spanning trees, programs and problems of transport and allocation)</li> <li>4. Using formalism based on conceptual graph theory to show new properties.</li> <li>5. Can adapt an algorithm to reach a new or original objective Can model and solve a problem of sequencing with or without resources and understand the associated concepts (critical path, PERT, GANTT, deadlines, earliest or last date)</li> <li>6. Understand the concept of sequencing in the context of project co-ordination.</li> <li>7. Can model an optimization problem in the form of a linear program (LP) and know how to solve it graphically or with algebra or using a spread-sheet solver.</li> </ol>					
<b>Content</b> :					
<ol style="list-style-type: none"> <li>1. Data structures</li> <li>2. Problems of queuing</li> <li>3. Problems of sequencing</li> <li>4. Linear programming</li> <li>5. Transport problems</li> <li>6. Project</li> </ol>					
<b>Bibliography</b> :					
<ol style="list-style-type: none"> <li>1. <b>PRATT</b>, William K., <i>Précis de recherche opérationnelle - 2es cycles / Master - Ecoles d'ingénieurs - Cours et exercices d'application</i>, Dunod, Paris, 2004, 5<sup>ème</sup> édition, 520 pages. [Operational Research Summary, for Master Courses and Engineering schools- course work and exercises]</li> <li>2. <b>GUERET</b>, Christelle, <b>PRINS</b>, Christian, <b>SEVAUX</b>, Marc, <i>Programmation linéaire</i>, Eyrolles, Paris, 2000, 384 pages.[Linear Programming]</li> <li>3. <b>ROSEAUX</b> (collectif), <i>Exercices et problèmes résolus de recherche opérationnelle : Tome 1, Graphes : leurs usages, leurs algorithmes</i>, Dunod, Paris, 2005, 300 pages.</li> <li>4. <b>ROSEAUX</b> (collectif), <i>Recherche opérationnelle - Tome 3 : Programmation linéaire et extensions, problèmes classiques - 2es cycles / Master, écoles d'ingénieurs, Exercices et problèmes résolus</i>, Dunod, Paris, 2004, 374 pages.</li> </ol>					
<b>Teaching approach</b> :					
<b>Activity</b>	<b>Person in charge</b>	<b>Type</b>	<b>Duration</b>	<b>/week</b>	<b>Evaluation</b>
L	Christophe MATHIEU	L	32h	3h30	1 W, 1 O
P	Antoine GAGNEUX	P	16h	4h / 2weeks	R, O



<b>Code</b> : 7S UP3		<b>MECHANICAL DESIGN 2</b>			<b>Level</b> : M1	
<b>Year</b> : 4 <b>Semester</b> : 7					<b>ECTS Credits</b> : 3	
<b>Subtitles/ Objectives</b> : Applied mechanics  Documentary and analytical study of devices, for dynamic behaviour of vehicles, from both a mechanical and energy point of view.				<b>Teaching Language</b> : French		
<b>Teacher in charge</b> : Vincent RICOL						
<b>Duration (number of allocated hours)</b> 48 h		<b>Evaluation</b>		<b>Coefficients</b>		
		MCQ		3		
		Written exam		2		
		Project		2		
<b>Prerequisite</b> : Classes in general mechanics applied to engineering Classes in fluid mechanics						
<b>Skills acquired</b> :  Know technologies used in the development of an industrial product. Calculating and then selecting common industrial equipment (engine, gearing system, pump, cylinders...)						
<b>Content</b> : Dynamic of vehicles and loads : Designing a combustion engine and an electrical motor according to its performances; adapting the torque and speed using a gearing system or a gearbox. Assessing the performance of each solution according to its efficiency: optimizing consumption, evaluating energy losses, providing sufficient power while maintaining a safety margin, evaluating inertia of the start-up system. Designing the braking system. Studying the thermal behaviour of disc brakes. Putting fluids into movement: analysing the hydraulic circuits. Calculating loss of energy. Selecting pumps. Adapting their operating points using valves. Pneumatic and hydraulic applications: Designing a pneumatic or hydraulic actuator, with fluid feed systems and control and adjustment devices						
<b>Bibliography</b> : <b>ESNAULT, Francis</b> , <i>Construction mécanique</i> , Dunod[ Mechanical Construction] <b>PICARD, Serge</b> , <i>Transmission et freinage</i> , Delta Press.[Transmissions and Braking]						
<b>Teaching approach</b> :						
<b>Activity</b>	<b>Person in charge</b>	<b>Type</b>	<b>Duration</b>	<b>/week</b>	<b>Evaluation</b>	<b>Project</b>
SG	Vincent RICOL <a href="mailto:vincent.ricol@ecam.fr">vincent.ricol@ecam.fr</a>	SG	32	4	W	16h

<b>Code</b> : 7S UP4 UE1		<b>AUTOMATION</b>			<b>Level</b> : M1
<b>Year</b> : 4 <b>Semester</b> : 7					<b>ECTS Credits</b> : 4
<b>Subtitles/ Objectives</b> :				<b>Teaching Language</b> :	
Be able to analyse an industrial process in order to create servo-control using common techniques in industrial control system Acquire necessary skills to understand advanced control techniques.				French	
<b>Teacher in charge</b> : Dominique Gehin					
<b>Duration (number of allocated hours)</b> : 44		<b>Evaluation</b> :		<b>Coefficient</b> :	
		Written exam		1,5 (x2)	
		Oral exam		2	
		MATLAB Practical work mark		1	
<b>Prerequisite:</b> Automation classes from semesters 1 and 2 (preparatory year courses).					
<b>Skills acquired</b> :					
.Know the common techniques of servo-control and their typical applications					
.Understanding the principles of physics in this context					
.Know principal methods, their limitations and the usual applications of controllers. Good knowledge of technical vocabulary.					
. Able to choose a solution adapted to the servo-control processes.					
<b>Content</b> :					
- Servo-control and control of continuous linear systems					
- PID control methods					
- Studying non-linear systems					
- Sampled-data linear system control. discrete PID control, RST control, model predictive control, feedback loop control					
- Identification methods					
- Introduction to MATLAB					
<b>Bibliography</b> :					
<b>GEHIN D.</b> , <i> systèmes asservis linéaires, non linéaires et échantillonnés</i> , ECAM Lyon, 1999.[Linear, Non-linear and Sampled-Data(Discrete) Control Systems]					
<b>Techniques de l'Ingénieur(Engineering Techniques)</b>					
<b>Teaching approach:</b>					
<b>Activity</b>	<b>Person in charge</b>	<b>Type</b>	<b>Duration</b>	<b>/week</b>	<b>Evaluation</b>
L	Dominique GEHIN	L	36h		2 W 1 oral
PW	Dominique GEHIN	PW	8h		Practical work Evaluation

<b>Code :</b> 7S UP5	<b>ELECTRICAL ENGINEERING AND ELECTRONICS</b>	<b>Level :</b> M1
<b>Year :</b> 4 <b>Semester :</b> 7		<b>ECTS Credits :</b> 8
<b>Teaching Units :</b> > 7S UP5 UE1: <b>ELECTRONICS</b> > 7S UP5 UE2: <b>ELECTRICAL ENGINEERING</b>		<b>Teaching Language :</b> French
<b>Teacher in charge :</b> Christophe JOUVE		
<b>Teachers :</b> Dominique Tissier Christophe Jouve Jean-Noël Charvet	<b>Subject :</b> Applied electricity Electronics Microelectronics	
<b>Duration (number of allocated hours) :</b> 101	<b>Evaluation :</b> Electronics written exam MIC Electronics oral exam Electronics practical work mark Electric motors written exam Electric motors practical work mark	<b>Coefficients</b> 1,5 (x2) 1,5 2 1 1,5 1
<b>Prerequisite :</b> Electrical engineering classes and practical work from semesters 5 and 6 Physics classes in preparatory-year courses from semesters 1 & 2.		
<b>Skills acquired :</b> Knowledge about how principal components and electronic parts work. Understanding diagrams Working principle of a microcontroller and knowledge of programming languages assembler and C. Knowledge of electric motors and their common applications. Ability to design and choose an electric motor for common applications.		
<b>Content :</b> <b>1. Electronics :</b> Semi-conductors – diodes – thyristor – transistors MOS-FET Amplifiers : push-pull – differential amplifiers – oscillators Filters – data converters D/A A/D Numeration – coding – data transmission Digital memory Micro-controller - applications  <b>2. Electrical Engineering</b> Rotating machines – advantages and applications Direct current motors, asynchronous motors Single phase motors		

<b>Code</b> : 7S UP6		<b>INNOVATION PROJECT</b>			<b>Level</b> : M1
<b>Year</b> : 4 <b>Semester</b> : 7					<b>ECTS Credits</b> : 2
<b>Subtitles/ Objectives</b> :				<b>Teaching Language</b> :	
Product development project working from the idea of demand, its validation on the market and also the making of a prototype.				French	
<b>Teacher in charge</b> : Gaëlle PIAUD					
<b>Teachers</b> : Gaëlle Piaud					
<b>Duration (number of allocated hours)</b> : 16		<b>Evaluation</b> :		<b>Coefficients</b> :	
		Written report		1	
		Oral presentation		1	
<b>Prerequisite</b> :					
Classes in mechanical design Classes in electronics and electrical engineering					
<b>Skills acquired</b> :					
<ul style="list-style-type: none"> <li>• The concept of the market</li> <li>• Writing technical specifications</li> <li>• Using patents as the source of scientific and technical information</li> <li>• Brainstorming and arguing by analogy techniques</li> </ul>					
<b>Content</b> :					
<p>Group Project and team organisation</p> <p>Market study</p> <p>Technical specifications and functional analysis</p> <p>Brainstorming about the functions</p> <p>Evaluating possible solutions</p> <p>Choosing a technical solution</p> <p>Industrial property</p> <p>Developing a prototype proving the technical feasibility of the chosen solution.</p>					
<b>Teaching approach:</b>					
<b>Activity</b>	<b>Person in charge</b>	<b>Type</b>	<b>Duration</b>	<b>/week</b>	<b>Evaluation</b>
Classes	Gaëlle Piaud Gaëlle.piaud@ecam.fr	L	4		
Project	Gaëlle Piaud	P	12		W and O



# **ECAM 4 ENGINEERING SCHOOL SEMESTER 8**

## ECAM 4 - SEMESTER 8


### LIST OF PROGRAMME UNITS


N°	Programme units	Person in charge	CREDITS	Title	Teaching Units
1	8S UP1	Yann MARCHESSE	7	<b>VIBRATIONS AND ACOUSTICS</b> Vibrations of discrete systems Acoustics Vibrations of continuous systems	8S UP1 UE1 8S UP1 UE2 8S UP1 UE3
2	8S UP2	Patrice COUV RAT	6	<b>MATERIALS 2</b>	8S UP2 UE1
3	8S UP3	Dominique TISSIER	4	<b>ELECTRICAL ENGINEERING</b> Power Electronics	8S UP3 UE1
4	8S UP4	Christophe MATHIEU	3	<b>INFORMATION SYSTEMS</b> Networks and telecommunications Information systems Security(ISS)	8S UP4 UE1 8S UP4 UE2
5	8S UP5	Vincent RICOL	4	<b>APPLICATION PROJECT</b>	8S UP5 UE1
6	8S UP6	Abdelhakim AZIZ	3	<b>INDUSTRIAL ORGANISATION</b> Production Management Maintenance and Reliability	8S UP6 UE1 8S UP6 UE2
7	8S UP7	Sophie MATHE	3	<b>ENTREPRENEURSHIP</b> Accounting Optional Role Play « M.I.M.E. » English Optional Second Language Application Placement	8S UP7 UE1 8S UP7 UE2 8S UP7 UE3 8S UP7 UE4 8S UP7 UE5


Each programme unit combines one or several teaching units. The credits are attributed to programme units. Depending on the subject, the teaching units include lectures, small group work, practical work, projects, case studies...

Unless otherwise specified on the teaching unit sheets, teaching is in French.

<b>Code</b> : 8S UP1	<b>VIBRATIONS AND ACOUSTICS</b>	<b>Level</b> : M1
<b>Year</b> : 4 <b>Semester</b> : 8		<b>ECTS Credits</b> : 7
<b>Teaching Units</b> :		<b>Teaching Language</b> :
> 8S UP1 UE1 : <b>VIBRATIONS OF DISCRETE SYSTEMS</b> > 8S UP1 UE2 : <b>ACOUSTICS</b> > 8S UP1 UE3 : <b>VIBRATIONS OF CONTINUOUS SYSTEMS</b>		French
<b>Teacher in charge</b> : Yann MARCHESSE		
<b>Teachers</b> :	<b>Subject</b> :	
Jean-Louis Guyader Yann Marchesse Serge Viala	Vibrations Acoustics Vibrations	
<b>Duration (number of allocated hours)</b> : 90	<b>Evaluation</b> :	<b>Coefficients</b> :
	Vibration of discrete systems written exam	0,5
	Vibration of discrete systems practical work mark	1
	Acoustics written exam	1
	Acoustics oral exam	1
	Vibrations of continuous systems written exams	1 (x2)
	Vibrations of continuous systems practical work mark	0,5
<b>Prerequisite</b> :		
5S UP3 UE1 : General Mechanics 6S UP2 UE1 : Structural calculations 5S UP1 UE1 : Mathematics and statistics		
<b>Skills acquired</b> :		
<ul style="list-style-type: none"> <li>Global understanding of vibroacoustic phenomena in mechanics, both from a theoretical point of view and through methods of calculating and measuring</li> <li>Ability to take into account the aspects of vibrations and acoustics in design or improvement of a product or process</li> </ul>		
<b>Content</b> :		
<b>1. Mechanical vibrations :</b> Vibrations of systems to a degree of freedom: setting up the equation according to the nature of the damping, interpreting the phenomenon of resonance, frequency response graphs, impulsional response Vibration of continuous systems : beam vibrations (longitudinal, torsional, bending), calculating the forced response by dynamic mode decomposition or by forced wave decomposition, Rayleigh Ritz approximation method- under structuration, mobile coupling Experimental Methods: sensors – conditioner – analysors – shaker – impact hammer.		
<b>2. Acoustics :</b> Acoustic Waves: the linear wave equation, acoustic intensity, spherical and plane waves. Acoustic Sources : simple acoustic sources (monopole and dipole), radiation from a simple vibrating surface. Reflection and transmission : normal and oblique incidences. Cavities and waveguides. Pipes, resonators and filters. Acoustics measurements: weighted sound levels, noise spectra, microphones, laboratory and in-situ measurements, acoustic intensity and acoustic power estimation.		

<b>Code</b> : 8S UP2	<b>MATERIALS 2</b>				<b>Level</b> : M1
<b>Year</b> : 4 <b>Semester</b> : 8					<b>ECTS Credits</b> : 6
<b>Subtitles/ Objectives</b> :				<b>Teaching Language</b> :	
<p>MATERIALS RUPTURE - ADVANCED MATERIAUX : Optimizing use of everyday materials so as to ensure that they last for the time required by the mechanical application – Introducing advanced materials as new mechanical solutions</p> <p>Basic knowledge required to understand materials fatigue and apply solutions to allow the specified durability.</p> <p>PVD/CVD Coating: NCD-DLC Coating: Industrial Interest . Potential Uses.</p> <p>Knowledge of ceramics – industrial uses</p>				French	
<b>Teacher in charge</b> : Patrice COUVRAT					
<b>Teachers</b> :				<b>Subject</b> :	
Patrice Couvrat Claire Rigollet Stanislaw Mitura (Technical University Lodz)				Materials Practical work Treatments, Surface Coating (DLC, NCD)	
<b>Duration (number of allocated hours)</b> : 78		<b>Evaluation</b> :		<b>Coefficients</b> :	
		Written exam 1 oral exam 1 practical work mark		1(x2) 1 1	
<b>Prerequisite</b> : Teaching Units Material science (semester 5) and materials 2 (semester 7)					
<b>Skills acquired</b> :					
<ul style="list-style-type: none"> <li>• Understanding fatigue mechanisms for materials used in mechanics</li> <li>• Measuring fatigue in mechanical structures : essential knowledge</li> <li>• Concept of toughness : Materials resistance to rupture- basic knowledge</li> <li>• Plastic Fatigue : basic knowledge and applications</li> <li>• Advanced materials</li> <li>• Ceramics : basic knowledge</li> <li>• Treatments and surface coatings DLC NCD : basic knowledge</li> </ul>					
<b>Content</b> :					
<ul style="list-style-type: none"> <li>- Study of fatigue mechanisms</li> <li>- Wöhler curves &amp; endurance diagrams(Haigh, VDI, etc..)</li> <li>- Rupture mechanics-toughness</li> <li>- Plastic fatigue-fatigue resistance diagram.</li> <li>- Ceramics : Structural relationships- properties, mechanical study-rupture statistics-industrial uses</li> <li>- NCD –DLC coatings : Structural relationships- properties of diamonds. Industrial applications.</li> </ul>					
<b>Bibliography</b> : ECAM Class handouts Classes, Fatigue, Ceramics, DLC-NCD (on intranet)					
<b>Teaching approach:</b>					
<b>Activity</b>	<b>Person in charge</b>	<b>Type</b>	<b>Duration</b>	<b>/week</b>	<b>Evaluation</b>
Classes - excersises	Patrice Couvrat Patrice.couvrat@ecam.fr	L	50	2	2W et 10
Practical work	Claire Rigollet Claire.rigollet@ecam.fr	PW	28		R

<b>Code</b> : 8S UP3	<b>ELECTRICAL ENGINEERING 2</b>	<b>Level</b> : M1
<b>Year</b> :4 <b>Semester</b> : 2		<b>ECTS Credits</b> : 4
<b>Teaching Units</b> : 8S UP3 UE 1 : Power Electronics		<b>Teaching Language</b> : French
<b>Teacher in charge</b> : Dominique TISSIER		
<b>Teachers</b> : Guy Vassal Christophe Jouve		<b>Subject</b> : Electronics
<b>Duration (number of allocated hours)</b> : 34	<b>Evaluation</b> :	<b>Coefficients</b> :
	Written exam	1,5 (x2)
	Oral	2
	Microcontroller practical work	1
	Electronics' project	0,5
<b>Prerequisite</b> : Electrical engineering classes from semesters 5, 6 and 7. Automation classes from semesters 1 and 2		
<b>Skills acquired</b> :		
<ul style="list-style-type: none"> <li>◆ Knowledge of electric motors, motor drive devices and their common applications</li> <li>◆ Designing and Choosing a motor and/or a speed variator device in everyday or new electrical engineering applications, with or without servo-control being needed.</li> </ul>		

<b>Code</b> : 8S UP4	<b>INFORMATION SYSTEMS</b>	<b>Level</b> : M1
<b>Year</b> :4 <b>Semester</b> : 2		<b>ECTS Credits</b> : 3
<b>Subtitles/ Objectives</b> : Systems architecture, networks & telecommunications	<b>Teaching Units</b> : 8S UP4 UE1 networks & telecommunications	<b>Teaching Language</b> French
<b>Teacher in charge</b> : Christophe MATHIEU		
<b>Teachers</b> : Christophe Mathieu Antoine Gagneux Laurent Sanglard	<b>Subject:</b> Networks Networks practical work Information system security	
<b>Duration (number of allocated hours)</b> : 38	<b>Evaluation</b> : networks & telecommunications Networks and Telecom practical work IT system security practical work	<b>Coefficients</b> : Assessment of skills
<b>Prerequisite</b> : Mastering computer networks applications – Level C2I®		
<b>Skills acquired</b> :		
<ul style="list-style-type: none"> <li>◆ Understand how a computer and telecom network functions</li> <li>◆ Develop a functional, physical and logical design of a company IT infrastructure and access security measures</li> <li>◆ Identify the functions of a telecom network, both at a conceptual level (OSI 7-layer model) and an operational level(TCP/IP protocol stack), overall functioning</li> <li>◆ Identify the elements of an IT system within a company : selection of IT equipment, system applications.</li> <li>◆ Know how to run a successful IT administration system : purchases, deployment, supervision, legal responsibilities</li> <li>◆ Identify risks to the security of IT systems</li> <li>◆ Organize the security of an IT system in personal and professional contexts</li> </ul>		
<b>Content</b> :		
<p><b>1.The Networks:</b> Introduction : models, RFC Physical layer Data link layer Network layer Transport layer Application layer</p> <p><b>2. IT Systems architecture:</b> Equipment Software Administration system IS Urbanization</p> <p><b>3. IT system security[ISS]within a company:</b> Organizational dimension ; Quality of the IT system ; Legal aspects ; Technical solutions ; Concluding seminar</p> <p><b>4. Practical Work :</b> Installing a firewall Multi-platform network protocol analysis Installing and securing an IT system</p>		

**Bibliography :**

**MATHIEU** Christophe, *Introduction aux Réseaux – TCP/IP et Autres Standards*, support de cours : ECAM Lyon, Lyon, 33<sup>ème</sup> édition, 2005, 119 pages.[Introduction to Networks]

**COMER** Douglas, *TCP/IP : Architecture, protocoles, applications*, InterEditions/Masson, Paris, Troisième édition, 1996, 608 pages.[ TCP/IP Architecture, protocols, application]

**SIYAN** Karanjit S., *TCP/IP*, CampusPress France, 1999, 705 pages.


<http://www.guill.net>,


<http://www.urec.cnrs.fr/cours/> (Unité réseaux du CNRS)

<http://charon.minilab.bdeb.qc.ca/inf850/ouimetch/>

**Teaching approach:**

Activity	Person in charge	Type	Duration	/week	Evaluation
Classes	Christophe Mathieu	L	10h	3h	W
Seminar	Specialist in ISS		16h	4h	W
PW	Antoine.Gagneux antoine.gagneux@ecam.fr	PW	12H	4H	P

<b>Code</b> : 8S UP5	<b>APPLICATION PROJECT</b>				<b>Level</b> : M1
<b>Year</b> : 4 <b>Semester</b> : 8	<b>Compulsory</b> Optional	<b>Type</b> : Project		<b>ECTS Credits</b> : 4	
<b>Subtitles/ Objectives</b> :				<b>Teaching Language</b> :	
Know tools of project management, Organise work for a team of 6 to 7 students Solve technical problems using an industrial approach. Create a product or an industrial installation according to a customer's requirements				French	
<b>Teacher in charge</b> : Vincent RICOL					
<b>Teachers</b> :			<b>Subject</b> :		
Vincent Ricol Damien Marx Véronique Chirié			Industrial techniques Project management Project management		
<b>Duration (number of allocated hours)</b> : 56			<b>Evaluation</b> :		<b>Coefficients</b> :
			Written exam Oral exam project		1 mark
<b>Prerequisite</b> :					
Industrial Techniques 1. Project management classes					
<b>Skills acquired</b> :					
<ul style="list-style-type: none"> <li>• Be able to accurately define a client's requirements : market stakeholders, limiting factors, expected performances, available means.</li> <li>• Be able to carry out a functional analysis and write complete technical specifications.</li> <li>• Manage human resources and means necessary to carry out a project. Do project scheduling (Pert, Gantt).</li> <li>• Apply an engineer's scientific and technical knowledge transversally so as to give a technical solution which can be substantiated.</li> </ul>					
<b>Content</b> :					
Applying the project management methodology: life cycle of a product, environmental elements which could be relevant to the product, writing functional specifications with performance functions and criteria. Defining a detailed technical response to the requirements. Break-down of basic tasks with resources allocated accordingly. Setting up a planning schedule. Carrying out technical investigation, searching for suppliers, selecting necessary industrial components, preparing a substantiated technical proposal. Writing a technical report and presenting the project to examiners.					
<b>Bibliography</b> :					
TASSINARI, Robert, <i>Pratique de l'Analyse Fonctionnelle</i> , Dunod.[Practical Functional Analysis]					
<b>Teaching approach:</b>					
<b>Activity</b>	<b>Person in charge</b>	<b>Type</b>	<b>Duration</b>	<b>/week</b>	<b>Evaluation</b>
Seminar	Damien Marx Michel Turquin	L L	2 2		
Project	Vincent Ricol vincent.ricol@ecam.fr	SG	48	4	1 W + 1 O
Tutorials	Vincent Ricol Damien Marx Michel Turquin		4		

<b>Code</b> : 8S UP6	<b>INDUSTRIAL ORGANISATION</b>		<b>Level</b> : M1
<b>Year</b> : 4 <b>Semester</b> : 8	<b>Compulsory</b> Optional	<b>Type</b> : CM+TD+P	<b>ECTS Credits</b> : 3
<b>Teaching Units</b> :		<b>Teaching Language</b> :	
<ul style="list-style-type: none"> <li>➢ 8S UP6 UE1 : <b>PRODUCTION MANAGEMENT</b></li> <li>➢ 8S UP6 UE2 : <b>MAINTENANCE AND RELIABILITY</b></li> </ul>		French	
<b>Teacher in charge</b> : Abdelhakim AZIZ			
<b>Teachers</b> :	<b>Subject</b> :		
Gaëlle Piaud Abdelhakim Aziz	Production management Maintenance and reliability		
<b>Duration (number of allocated hours)</b> : 33	<b>Evaluation</b> :		<b>Coefficients</b> :
	Production management project		1,5
	SG work: maintenance and reliability		0,5
	Project : Maintenance and reliability		1
<b>Prerequisite</b> :			
Industrial Engineering classes (semester 6) Statistics classes and laws of probability			
<b>Skills acquired:</b>			
The essential skills of a production engineer specialised in production management and maintenance of industrial tools and equipment are set out in the teaching unit tables below:			
<ul style="list-style-type: none"> <li>- Use an industrial and commercial plan</li> <li>- Use a production manager's program</li> <li>- Know how to calculate net production requirements</li> <li>- Know how to manage stock</li> <li>- Know how to use the Kanban tool</li> <li>- Know how to analyze product flow and the information flow needed to improve it</li> <li>- Know how to choose the maintenance plan necessary for given equipment and how to implement it</li> <li>- Know how to do a comprehensive analysis of the full range of equipment, carry out a RMA (reliability, maintainability, availability) investigation and develop an appropriate maintenance policy</li> <li>- Know how to develop and carry out a maintenance project</li> </ul>			
<b>Content</b> :			
<b>1. Production Management</b>			
<ul style="list-style-type: none"> <li>- Setting up an Industrial and Commercial plan (ICP)</li> <li>- Setting up a product delivery process ( PDP)</li> <li>- Calculating Net Needs</li> <li>- Stock management</li> <li>- Kanban and Just in time (JIT)</li> <li>- Material and Information Flow Analysis (MIFA)</li> </ul>			
<b>2. Maintenance and reliability</b>			
<ul style="list-style-type: none"> <li>- Introducing maintenance, the different forms, the fields of application</li> <li>- Do RMA (reliability, maintainability, availability) investigation on production equipment(FMEA-production means, systems which can be repaired, reliability indicators, spare parts stock control system, case study, etc...)</li> <li>- Introduction to new maintenance procedures : <b>TPM</b> (Total <b>P</b>roductive <b>M</b>aintenance) et <b>MBR</b> (<b>M</b>aintenance <b>B</b>ased on <b>R</b>eliability) + Developing and carrying out maintenance projects.</li> </ul>			

<b>Code</b> : 8S UP7	<b>ENTREPRENEURSHIP</b>		<b>Level</b> : M1
<b>Year</b> : 4 <b>Semester</b> : 8	<b>Compulsory</b> Optional	<b>Type</b> : L+SG	<b>ECTS Credits</b> : 3
<b>Teaching Units :</b> ➤ 8S UP7 UE1 : <b>ACCOUNTING</b> ➤ 8S UP7 UE2 : <b>ROLE PLAY MIME</b> (entrepreneurship simulation) optional ➤ 8S UP7 UE3 : <b>ENGLISH</b> ➤ 8S UP7 UE4: <b>SECOND LANGUAGE</b> , optional ➤ 8S UP7 UE5: <b>APPLICATION PLACEMENT</b>		<b>Teaching Language :</b> French English	
<b>Teacher in charge</b> : Sophie MATHE			
<b>Teachers :</b> Michel Blavier Maurice Rochet Benoît Marbach Benoît Marbach Sylvie Sanchez-Forsans Philippe Sallaut  Teresa Griot Emilie Comtet Isobel Siroy Florence Torrossian  Christian Bouet Simin Lin Isabelle Colliat Takako Zundel		<b>Subject :</b> Accounting MIME role play Presenting sectors of activity Presenting the engineering profession Team Management – Industrial techniques project Diversity  English English English English <i>2<sup>nd</sup> Language :</i> German Chinese Spanish Japanese	
<b>Duration (number of allocated hours) :</b> 40 H ENTREPRENEURSHIP 12 H LANGUAGES		<b>Evaluation :</b> Accounting written exam Enterprise Simulation Engineering Profession and activities sector presentation English written exam Application Traineeship presentation	<b>Coefficients :</b>  1 0,5 1 1 1

**Skills acquired :**

- Able to use basic principles of accounting and interpret financial accounting results
- Apply financial control and accounting skills in a simulation of company creation and management
- Know the sectors of activity and jobs of the future engineer so as to develop career plans
- Able to set up and work in a team
- Know fundamental principles of managing diversity

# **ECAM 5 ENGINEERING SCHOOL SEMESTER 9**

## ECAM 5 - SEMESTER 9 (OR SEMESTER 10)

### LIST OF PROGRAMME UNITS

N°	Programme Units	Person in charge	CREDITS	Title	Teaching Units
1	9S UP1	Guy VASSAL	4	<b>SCIENTIFIC MODULES</b> 3 modules out of 4 or 5 over three sessions (Optional)	9S UP1 UE1 to 9S UP1 UE15
2	9S UP2	Dominique TISSIER	4	<b>LABORATORY RESEARCH PROJECT</b> Automation Electrical Engineering Energy System Materials	9S UP2 UE1 9S UP2 UE2 9S UP2 UE3 9S UP2 UE4
3	9S UP3	Denis FLECHE	10	<b>RESEARCH AND DEVELOPMENT PROJECT</b>	9S UP3
4	9S UP4	Teresa GRIOT	4	<b>ENGLISH</b>	9S UP4 UE1
5	9S UP5	Sophie MATHE	8	<b>BUSINESS STUDIES</b> Management Company Law Health & Safety Law International business Cultural management	9A UP5 9S UP5 UE1 9S UP5 UE2 9S UP5 UE3 9S UP5 UE4 9S UP5 UE5 9S UP5 UE6


Each programme unit combines one or several teaching units. The credits are attributed to programme units. Depending on the subject, the teaching units include lectures, small group work, practical work, projects, case studies...


Unless otherwise specified on the teaching unit sheets, teaching is in French

**Comment:**


Half the students carry out the abovementioned programme during semester 9. The other half carry out an engineering internship. In semester 10, they change over.

The teaching programme is identical in semester 9 and 10.

<b>Code :</b> 9S UP1	<b>OPTIONAL SCIENTIFIC MODULES</b>		<b>Level :</b> M2
<b>Year :</b> 5 <b>Semester :</b> 9 ou 10	Compulsory <b>Optional</b>	<b>Type :</b> L+SG+P	<b>ECTS Credits :</b> 4
<b>Teaching Units :</b> <ul style="list-style-type: none"> <li>• <b>DATA-BASES</b></li> <li>• <b>SCHNEIDER</b></li> <li>• <b>NANOTECHNOLOGIES</b></li> <li>• <b>MODELING TURBULENCE- COMPUTATIONAL FLUID DYNAMICS (CFD)</b></li> <li>• <b>INFORMATION SYSTEM SECURITY (ISS)</b></li> <li>• <b>CIVIL ENGINEERING</b></li> <li>• <b>LEAN PRODUCTION</b></li> <li>• <b>ALSTOM</b></li> <li>• <b>AREVA</b></li> <li>• <b>ENERGY CHALLENGES FOR THE XXI<sup>ST</sup> CENTURY</b></li> </ul>			<b>Teaching Language :</b> French
<b>Teacher in charge :</b> Guy VASSAL			
<b>Teachers :</b>  See module sheets	<b>Subject</b>  See module sheets		
<b>Duration (number of allocated hours) :</b> 48		<b>Evaluation :</b> Session 1 Session 2 Session 3	<b>Coefficients :</b> 1 1 1
<b>Organisation :</b> <p>There are 3, four-week sessions during the semester. 4 or 5 modules are offered in each session. The student must choose 3 modules (one per session).</p> <p>From one semester to another some modules may be offered for a different session, or not be offered at all.</p> <p>Each module includes a project or a case study, which requires a minimum of 10 to 15 hours of personal work.</p>			
<b>Prerequisite :</b> SG and PW classes in previous semesters dealing with relevant subjects.			

<b>Code</b> : 9S UP2	<b>LABORATORY RESEARCH PROJECT (LRP)</b>		<b>Level</b> : M2
<b>Year</b> : 5 <b>Semester</b> : 9 or 10	<b>Compulsory</b> Optional	<b>Type</b> : PW	<b>ECTS Credits</b> : 4
<b>Teaching Units</b> : ➤ 9S UP2 UE1 : <b>LRP AUTOMATION</b> ➤ 9S UP2 UE2 : <b>LRP ELECTRICAL ENGINEERING</b> ➤ 9S UP2 UE3 : <b>LRP ENERGY SYSTEMS</b> ➤ 9S UP2 UE4 : <b>LRP MATERIALS</b>		<b>Teaching Language</b> : French	
<b>Teacher in charge</b> : Dominique TISSIER			
<b>Teachers</b> : Dominique Gehin Dominique Tissier Souhil Seguir-Ouali Pierre Lourdin	<b>Subject</b> : Automation Electrical Engineering Energy Systems Materials		
<b>Duration (number of allocated hours)</b> : 96	<b>Evaluation</b> : 1 exam for each subject (one or several reports, project report and/or an oral presentation) :		<b>Coefficient</b> : 1 (x4)
<b>Prerequisite</b> :  SG and PW classes in previous semesters dealing with relevant subjects.			
<b>Skills acquired</b> :  In the 4 relevant subject areas : <ul style="list-style-type: none"> <li>• Organise an experimental investigation to highlight phenomena or behaviour</li> <li>• Process and interpret important results after carrying out quantified analytic study</li> <li>• A written report and an oral presentation will be required</li> </ul>			

<b>Code</b> : 9S UP3	<b>RESEARCH &amp; DEVELOPEMENT PROJECT (RDP)</b>		<b>Level</b> :M2
<b>Year</b> : 5 <b>Semester</b> : 9 or 10	<b>Type</b> : P		<b>ECTS Credits</b> : 10
<b>Subtitles/ Objectives</b> Technological or applied research project, at the level of a graduate engineer, carried out for a professional customer or for an ECAM laboratory, in one of the departments of the school under the supervision of a permanent staff member.			<b>Teaching Language</b> : French
<b>Teacher in charge</b> : Denis FLECHE			
<b>Teachers</b> : Department Heads :  Guy Vassal Christophe Mathieu Pierre Lourdin Christophe Changenet Jean-Louis Arosio  and permanent teachers in each department.		<b>Department</b> :  Electrical Engineering and Automation IT Materials Mechanics Industrial Engineering	
<b>Duration (number of allocated hours)</b> : 250	<b>Evaluation</b> : 1 Project	<b>Coefficient</b> 1	
<b>Prerequisite</b> :			
<ul style="list-style-type: none"> <li>• Knowledge and theoretical and experimental skills acquired in small group and practical classes, and also projects on relevant subjects carried out in previous semesters</li> <li>• Project management</li> </ul>			
<b>Skills acquired</b> :			
<ul style="list-style-type: none"> <li>• Capable of obtaining results by undertaking a scientific and technical research, planned and carried out with attention to detail</li> <li>• Able to present the results and the strategy to industrial associates (customers)</li> <li>• Human relations, commitment, efficiency, autonomy, personal organisation</li> </ul>			
<b>Organisation and content</b> :			
<p>Research and development projects are mostly carried out in association with a company.</p> <p>At the start of the semester, the laboratory projects (mechanics, Industrial Engineering, Electrical Engineering, materials, IT) are introduced, specifying the number of available places for students in each project for the semester. Each student must choose a laboratory and a project.</p> <p>The research and development projects are generally carried out in twos.</p> <p>The research and development project includes the following with varying levels of importance :</p> <ul style="list-style-type: none"> <li>• Rewriting specifications , organising the project and liaising with the "customer"</li> <li>• Liaising with and reporting back to the teacher in charge</li> <li>• Bibliographic research</li> <li>• Theoretical investigation</li> <li>• Experimental investigation</li> <li>• Formalizing results and presenting them in technical progress meetings</li> <li>• Setting up a final report (file, IT programmes), documentation</li> <li>• Final presentation (oral presentation) for validation</li> </ul>			

<b>CODE :</b> 9S UP4	<b>ENGLISH</b>			<b>LEVEL :</b> M2	
<b>Year :</b> 3 <b>Semester :</b> 7	<b>Type :</b> L + SG + PW		<b>ECTS Credits :</b> 4		
<b>Subtitles/ Objectives :</b> TOEIC preparation (score to be obtained 750) Scientific and technical English			<b>Teaching Language :</b> English		
<b>Teacher in charge :</b> Teresa GRIOT					
<b>Teachers :</b>			Teresa Griot Krystyna Knight		
<b>Duration (number of allocated hours) :</b> 60			<b>Evaluation :</b> 1 written exam 1 oral exam TOEIC exam Continuous assessment	<b>Coefficients :</b> 1 1 Yes/no 1	
<b>Prerequisite :</b> Level reached in previous semester					
<b>Skills acquired :</b>  Fluent English and scientific and technical English  TOEIC (score aimed 750)  <b>The score of 750 for the TOEIC exam in ECAM 5 is compulsory to receive the ECAM Engineer Diploma</b>					
<b>Content :</b> <ul style="list-style-type: none"> <li>• Mini Seminars on scientific and technical subjects</li> <li>• TOEIC preparation</li> <li>• Conversation</li> </ul>					
<b>Teaching approach:</b>					
<b>Activity</b>	<b>Person in charge</b>	<b>Type</b>	<b>Duration</b>	<b>/week</b>	<b>Evaluation</b>
TOEIC preparation	Isobel Siroy	SG			TOEIC Exam
Tutorials/conversation	Teresa Griot <a href="mailto:teresa.griot@ecam.fr">teresa.griot@ecam.fr</a> Isobel Siroy <a href="mailto:isobel.siroy@ecam.fr">isobel.siroy@ecam.fr</a>	SG			

<b>Code</b> : 9S UP5	<b>BUSINESS STUDIES</b>		<b>Level</b> : M2
<b>Year</b> : 5 <b>Semester</b> : 9 or 10	<b>Type</b> : L+SG+P		<b>ECTS Credits</b> : 8
<b>Teacher in charge</b> : Sophie MATHE			
<b>Teaching Units</b> :		<b>Teaching Language</b> :	
➤ 9S UP5 UE1 : <b>MANAGEMENT</b> ➤ 9S UP5 UE2 : <b>COMPANY LAW</b> ➤ 9S UP5 UE3 : <b>SAFETY-ENVIRONMENT</b> ➤ 9S UP5 UE4 : <b>Law</b> ➤ 9S UP5 UE5 : <b>INTERNATIONAL BUSINESS</b> ➤ 9S UP5 UE6 : <b>CULTURAL MANAGEMENT</b>		French	
<b>Teachers</b> :		<b>Subject</b>	
Sophie Mathé		Job-hunting techniques	
Gilles Meurisse		Management	
David Lebental		Labour Law	
Rachel Guyet		Intercultural Management	
Alain Hervé		Safety-Environment	
Bruno Vuillermoz		Industrial Property	
Gilbert Cudennec		International Business – Company case study	
Sylvie Sanchez-Forsans		Personal Development	
Yann Bergeaud		Company Law	
<b>Evaluation for each module</b> :		1 Management written exam 1 Company Law written exam 1 report about safety-environment 1 Law written exam 1 International Business written exam 1 report about Case Study	
<b>Prerequisite</b> :			
Internships, interpersonal Skills Training, accounting and languages in previous semesters			
<b>Skills acquired</b> :			
<ul style="list-style-type: none"> <li>Necessary methods and knowledge for an engineer in a company (management, law, industrial properties..)</li> <li>Ability to optimize his or her presentation skills and acquired technical skills in order to enter professional life in the best possible conditions.</li> </ul>			

# **ECAM 5 ENGINEERING SCHOOL SEMESTER 10**

<b>CODE</b> : 10S UP1	<b>FINAL ENGINEERING INTERNSHIP</b>		<b>LEVEL</b> : M2
<b>Year</b> : 5 <b>Semester</b> : 9 or 10	<b>Type</b> : Internship	<b>ECTS Credits</b> : 30	
<b>Subtitles/ Objectives</b> :			
The aim of this internship is not only to apply scientific and technical knowledge acquired at an engineer's level, but also to develop interpersonal and management skills within a company.			
<b>Teacher in charge</b> : Patrice COUVRAT			
<b>Teachers</b> :		<b>Subject</b> :	
Permanent teachers (Tutors) See overleaf regarding the role of tutors		Depending on the internship	
<b>Evaluation</b> :			Coefficient
	Evaluated by the training supervisor		2
	Grading internship report		1
	Grading presentation		1
<b>Prerequisite</b> :			
Practical work experience and application traineeship			
<b>Skills acquired</b> :			
<ul style="list-style-type: none"> <li>- team work skills, at an engineering level</li> <li>- personal organisation</li> <li>- self-sufficiency when dealing with work</li> <li>- written and oral reports</li> <li>- an open mind to questions about the job, management techniques, running meetings, scheduling etc</li> </ul>			
<b>Organisation and content</b> :			
The internship must be carried out :			
<ul style="list-style-type: none"> <li>- In a company in France</li> <li>- Abroad, in a company or university laboratory working with companies on <b>industrial, scientific, technical and organisational</b> subjects.</li> </ul>			
The mission must be clearly defined by the company, the criteria for assessing the student 's work experience also needs clear definition, and his supervisor should be an engineer.			
The internship assessment is carried out jointly by the internship supervisor and a tutor designated by the Studies Director.			
Assessment tables are used to assess the quality of the work, the report and the oral presentation.			

