	General training	Materials	Materials mechanics and processes	Materials characterization	Computing / Modelling
1st semester	General training 1 – 50 h 6 ECTS X. Xxxxxx 1. French and/or English 2. Energy and ecological transition 3. Materials in society / Resources 4. Life cycle analysis / Re-using / Recycling	Materials 1 – 60 h 7 ECTS J. Favre 1. Introduction on microstructure/properties relationship 2. Basics of crystal structures 3. Thermodynamics and Phase diagrams 4. Phase transformations 5. Selection of materials	Materials mechanics 1 – 42 h 6 ECTS P. Baral 1. Introduction to Material mechanics and Continuum mechanics 2. Stress and strain definition 3. Linear elasticity 4. Beam theory 5. Yield criteria and hardening mechanisms 6. Experimental mechanical characterization	Materials characterization 1 – 50 h 6 ECTS C. Maurice 1. Light microscopy (metallography) 2. Electron microscopy 3. Microanalysis 4. EBSD	Computing 1 – 43 h 5 ECTS R. Ferrier 1. Vectors, matrices and tensors 2. Ordinary Differential Equations, Euler method 3. Statistics and probabilities 4. Non-linear problems and solvers (Newton and fixed-point) 5. Differential operators and Partial Differential Equations 6. Signal processing and Fast Fourier Transform
2nd semester	General training 2 – 50 h 6 ECTS X. Xxxxxx 1. French and/or English 2. Bibliographic survey – Analysis of scientific papers 3. Scientific writing and presenting 4. Preparation to professional life	Materials 2 – 70 h 7 ECTS F. Christien 1. Crystals defects 2. Physics of plastic deformation 3. Solid state diffusion 4. Surface and interfaces in materials 5. Mechanisms of crystallographic texture formation	Materials mechanics 2 – 50 h 6 ECTS A. Dréano 1. Overview of mechanical failure 2. Insight into continuum damage mechanics and fracture mechanics 3. Modes of failure: Fatigue, Creep, Bearing failures	Materials characterization 2 – 50 h 6 ECTS A. Borbely 1. X-ray diffraction 2. Other X-ray based methods (X-ray fluorescence, X-ray tomography) 3. Mass spectrometry 4. Thermal analysis	Computing 2 – 36 h 5 ECTS A. Aoufi 1. Introduction to FEM modelling using Python for linear stationnary thermo-elasticity problems 2. Advanced solutions of elastic and thermal problems using Abaqus
3rd semester	General training 2 – 30 + 200 h 6 ECTS F. Christien 1. French and/or English 2. Project management 3. Seminars 4. Lab project	Materials 3 – 70 h Durability of materials 7 ECTS C. Bosch 1. Electrochemical corrosion 2. Environment sensitive fracture 3. Tribology, wear, tribo-corrosion	Materials processes – 50 h 6 ECTS H. Klocker 1. Plastic forming and thermomechanical treatments 2. Additive manufacturing	Materials characterization 3 – 50 h 6 ECTS V. Barnier 1. Surface analysis (XPS) 2. AFM based methods 3. Micromechanics methods	Computing 3 – 50 h 6 ECTS C. Desrayaud 1. Time-dependant and non-linear FEM modelling 2. Other modelling methods in materials science
4th semester	Five to six month internship - 30 ECTS				