	General training	Materials	Materials mechanics and processes	Materials characterization	Computing / Modelling
1st semester (Fall)	General training 1 – 91.5 h 9 ECTS **J. Quartana** 1. French and/or English 2. Energy and ecological transition 3. Materials in society / Resources 4. Life cycle analysis / Re-using / Recycling	Materials 1 – 52.5 h 7 ECTS **J. Favre** 1. Introduction on microstructure/properties relationship 2. Basics of crystal structures 3. Thermodynamics and Phase diagrams 4. Selection of materials	Materials mechanics 1 – 51 h 7 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		Computing 1 – 55.5 h 7 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 (Spring)	General training 2 – 3 h (+ 50 h) 4 ECTS **X. Xxxxxx** Searching, analysing and summarising scientific literature	Materials 2 – 51 h 7 ECTS **F. Christien** 1. Crystals defects 2. Physics of plastic deformation 3. Solid state diffusion 4. Phase transformations 5. Surface and interfaces in materials	Materials mechanics 2 – 40.5 h 7 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 – 49.5 h 7 ECTS **A. Borbely / F. Christien** 1. X-ray diffraction / Crystallography 2. Optical and Electron Microscopies / Electron Probe MicroAnalysis	Computing 2 – 30 h 5 ECTS **W. Gonçalves** 1. Introduction to multiscale modelling 2. Molecular dynamics for nanomaterials 3. Python programming 4. Scale transition with Finite Element Method
3rd semester (Fall)	General training 2 – 40 h (+ 200 h) 7 ECTS **F. Christien** 1. French and/or English 2. Seminars 3. Lab project	Materials 3 – 50 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 (25 h) 2. Additive manufacturing (25 h)	Materials characterization 3 – 40 h 5 ECTS **K. Pandey / C. Minfray / A. Lamirand / V. Barnier / A. Kumar** 1. Transmission Electron Microscopy 2. X-ray Photo-electron Spectroscopy 3. Atomic Force Microscopy	Computing 3 – 50 h 5 ECTS **C. Desrayaud** 1. Time-dependant and non-linear FEM modelling 2. Other modelling methods in materials science
4th semester (Spring)	Five to six month internship – Preparation of the Master's Thesis - 30 ECTS				