

# SPIM-MM-902 Manufacturing processes and life cycle

**Master Degree : Mechanical Engineering and Material sciences**

**Reference number: SPIM-MM-902**

**Title of the subject : Manufacturing processes and life cycle**

Department : *Applied Mechanics and Mechanical engineering*

Coordinating lecturer : C. Schuman [christophe.schuman@univ-metz.fr](mailto:christophe.schuman@univ-metz.fr); L. Germain [Lionel.germain@univ-lorraine.fr](mailto:Lionel.germain@univ-lorraine.fr)

*Course is given each year*

Semester : *Autumn*

Total hours of classes : 60 h                      ECTS Credits : 4

Teaching language : French (Primary and secondary processes) and English (Life Cycle Analysis).  
The course is proposed in English for exchange students : Yes, see above.

Course composition	Coef.	Number of hours				
		Lectures	Tutorials	Practicals	Others	
Primary processes Shaping	0.33	16	4	4		CE
Secondary Processes	0.33	16	0	4		CE
Life Cycle Analysis	0.33	4	4	8		CE/Project

**Aim :**

The unit contains two main parts:

- 1) A presentation of the main industrial processes for structural materials: the primary shaping processes, called 'primary' (casting, wrought, molding and powders methods, etc ...) and the finishing processes called 'secondary' (machining, assembly, surface treatment).

The environmental assessment of industrial products and processes through the use of life cycle analysis according to ISO 14040.

**Prerequisites**

Good command of English and lever rule for Life cycle analysis

**Course syllabus**

**Course syllabus**

**Primary processes Shaping :**

- Introduction and Reminders
- Foundry ( alloys )
- Hot and Cold working processes ( metal alloys )
- Methods for compacting powders ( ceramics and alloys)
- Forming in the viscous state (glasses and polymers)
- Other processes

**Secondary processes :**

- Machining : turning, milling, HSC , etc. .
- Assembly :

- Welding / Brazing (Classification of main processes ; mechanical, thermal and metallurgical aspects )
- Adhesive bonding (Definition of structural bonding , Design of bonded assemblies , the different annuities families of adhesives, Implementation of product controls bonded assemblies)
- Surface treatment (carburizing , carbonitriding , deposits CVD, PVD , etc)

### **Life Cycle Analysis (LCA)**

At the end of the course, the students are able to perform an environmental assessment through the use of LCA.

- What's an LCA? What can it do?
- How perform an ISO-compliant LCA? Case study and exercises.
- Practicals on SIMAPRO software

### **Assessment system :**

Continuous evaluation is generalized in this Master Degree. Students will obtain information concerning the evaluation at the beginning of each semester.

When not passed, a second exam is planned after the end of the semester so the student has a second opportunity to obtain the ECTS credit

Mark is a composite between evaluation elements, which are listed below. The relative percentage of each item is provided on due time.

Homework  
Project  
Mid Exam  
Final Exam  
Practicals

The course syllabus, the academic weekly planning and the assessment system may be subject to variation. Modifications are dully announced in advance.