PROGRAM AND PURPOSE

Objectives of education:

The content of this course will allow students to undertake a study of analysis or synthesis of mechanical systems. At the licensing stage, three essential parts are to be considered:

(I) A mathematical reminder on the essential mathematical tools needed to study mechanisms (twist, vector product, commoment, linear systems, etc.).

(II) A good reading of a plane of a mechanical system with a view to releasing the equivalence classes, contact graph, standardized mechanical links, minimum schematization and classification of the mechanisms.

(III) Static and kinematic studies of parallel links, series links and closed chains.

Recommended prior knowledge:

Vector analysis, Industrial design, general technology, rational mechanical and mechanical manufacturing.

Algebra: Matrix, determinant, linear systems and matrix operations

Content of the material:

Chapter 1: Preliminary and Reminders

- Concept of the twist and its characteristics
- Definitions and assumptions:

Machine. Mechanisms. Kinematic chain. Fixed or built element. Binding/Kinematic torque. Plan mechanism. Spherical mechanism. Space mechanisms. Example of mechanisms.

- Usual mechanical connections:

Chapter 2: Modelling of mechanisms

- Graph associated with a mechanical system.
- Chains and kinematic diagrams of a mechanical system.

Chapter 3: Mobility and hyperstatism of a mechanism

- Definitions: Kinematic and static analysis of parallel links
- Kinematic and static analysis of series links
- Kinematic and static analysis of closed chains
- Systematic search for isostatic solutions.

Chapter 4: Kinematic analysis of planning mechanisms

- Definition of a plan mechanism
- Identification of parameters of a plan mechanism
- Grashoff's laws for 4-bar articulated mechanisms.
- Analysis of the movements of a plan mechanism (Graphic Method, Analytical Method, Case Study)

Chapter 5: Introduction to OAD and synthesis of mechanisms

- Design of an isostatic mechanism using DAO software (solidworks)
- Simulation on the Module CosmosMoution