



**COMPUTER AIDED ENGINEERING
AND DESIGN PROGRAM**

SYLLABUS

Course Title: **FRENCH LANGUAGE AND CULTURE**

Course Code: **LV1**

ECTS credits : **4**

Semester(s):	Spring
Duration:	16 weeks
Lectures:	34 hours
Independent Learning:	15 hours +
Examination:	Oral and Written Examination
Total Student Workload:	49 hours +
Aims:	To improve students' oral and written proficiency in French language in discovering and discussing French history, culture and politics.

Syllabus:

Basic Written Skills (Grammar, Spelling, Writing)

Written Comprehension

Newspaper articles analysis...

Listening Comprehension

TV and films extract analysis

Tapes

Speech and

Oral participation

Role play : everyday life (take the metro, grocery shopping, Post office, order in a restaurant,...).

French culture, politics, history and society

Module Title: **STRUCTURAL DESIGN**

Module code : **SM**

ECTS credits : **4**

Semester(s):	Spring
Duration:	12 weeks
Lectures:	20 hours
Laboratories:	20 hours
Independent Learning:	60 hours
Examination:	2-hours written examination Labwork report
Total Student Workload:	100 hours
Aims:	To learn the physical and numerical parameters which have to be taken into account in structures design. To get familiar with a structural analysis software.

Syllabus:

SM1 : Structure Analysis with Finite Element Method (20 hours)

Static Structure Analysis

- Energetic principles
- Finite Element Method
- Isoparametric Formulation
- Gauss Method for Solving Linear System

Dynamic Structure Analysis

- Linear Vibration
- Dynamic Structure with FEM

SM3 : Mechanical Sizing Simulation - NASTRAN (20 hours) - Labs

- Different ways of modelling a bar in pure tension or in pure bending using 1D and 2D elements
- Use of Rod, Beam, Membrane, Shell and Stear Panel Elements
- Modelling a truss structure (with and without weld joints)
- Comparison between numerical values and exp. Values obtained using gages on a real structure

Module Title: **COMPUTATIONAL FLUID DYNAMICS**

Module code : FE
ECTS credits : **2,5**

Semester(s):	Spring
Duration:	12 weeks
Lectures:	12 hours
Laboratories:	24 hours
Independent Learning:	24 hours
Examination:	2-hours written examination Labwork report
Total Student Workload:	60 hours
Aims:	To learn modelling techniques for fluid dynamics, numerical schemes, and meshing techniques

Syllabus:

FE1 : Computational Fluid Dynamics (12 hours)

- Conservation Equations (mass, energy, momentum...)
- Advection Terms
- Flow Determination
- Laminar and Turbulent Flows
- Structured and Non-structured Meshes
- Meshing a Surface, a Volume

FE2 : MATLAB CFD (8 hours) - Labs

- Practising numerical analysis in Fluid Dynamics

FE3 FLUENT (16 hours) - Labs

- Modelling of Flows about Airfoils and Wings
- Study of Heat Exchanger

Module Title: **SIGNAL PROCESSING**

Module code : **CS**

ECTS credits : **2**

Semester(s):	Spring
Duration:	12 weeks
Lectures:	12 hours
Laboratories:	12 hours
Independent Learning:	30 hours
Examination:	2-hours written examination Labwork report
Total Student Workload:	54 hours
Aims:	To give students methods and concepts for the modelling of engineering systems.

Syllabus:

CS1 : Signal Processing (12 hours)

- Fourier representation of continuous-time periodic signals
- Fourier transform
- The discrete-time Fourier transform
- Signals energy and power

CS2 : Signal Processing - Matlab Labs (12 hours)

Course Title: **COMPUTER AIDED ENGINEERING** Module Code: **OSN**
ECTS credits : **2**

Semester(s):	Spring
Duration:	12 weeks
Laboratories:	32 hours
Independent Learning:	20 hours
Examination:	Continuous assessment, Case studies, Mini-projects
Total Student Workload:	52 hours
Objectives	Instruments Design - To operate softwares tools and associated methods for each steps of the process.

Syllabus

OSN 2 : Mechanical Behaviour Simulation (ADAMS) - Labs (12 hours)

- Kinematic and Dynamic Analysis of a Vehicle Front Axle
- Study of the Dynamic Behavior of a Car

OSN 3 : Numerical Conception (CATIA V5) - Labs (20 hours)

- Design of an Aircraft Landing Gear

Module Title: PROJECT MANAGEMENT	Module code : CPT ECTS credits : 7,5
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Semester(s):	Spring
Duration:	12 weeks
Lectures:	78 hours
Independent Learning:	50 hours
Examination:	2-hours written examination (System Engineering) Written Project (RAMS, Functional Analysis) Simulation Game (Marketing)
Total Student Workload:	128 hours
Aims:	To acquire Project Management Techniques for wide Technical Projects To learn system reliability To learn to manage costs, deadlines, and human factors

Syllabus:

CPT1 : Project Management and Systems Engineering (26h)

- Human Resources
 - Time and Schedule Management
 - Economic and Financial Management

- System Life Cycle
 - Concurrent Engineering
 - Configuration Management within the V Cycle
 - Design Reviews
 - Various Phases
 - Transversal Aspects
 - Cost Management, Affordability
 - Risk Management
 - Optimisation
 - System Performance Management
 - Requirements Management
 - Procurement Constraints
 - Management of System Engineering

OPI1 : Functional Analysis (16 hours)

- Life Cost Principles
 - The Concept of Value
 - Introduction to Value Analysis
 - Terminology
 - Value Engineering
 - The Value Analysis Method
 - Value Analysis Process
 - Value Improvement Process
 - Function Analysis Techniques
 - Value Analysis and Functional Analysis for Reliability Studies

OPT 2 : RAMS (16 hours)

- Introduction
 - System Structure
 - Basic Reliability
 - Reliability Over Time
 - Failure Process
 - System Reliability Evaluation
 - Time and Failure Dependent Reliability
 - Fault Trees
 - Parameter Estimation

OPI2 : Marketing (20h) - Strategy Game

- Students divided in teams run a company and compete for the best benefits
- Finance, strategy, business, marketing tools

Module Title: DESIGN PROJECT	Module Code : PROJ ECTS credits : 8
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Semester(s):	Spring
Duration:	6 weeks
Lectures:	20 hours
Independent Learning:	200 hours
Examination:	Report and Oral Presentation
Total Student Workload:	220 hours
Aims:	To experience team working and to develop analysis and synthesis skills necessary to project management. To acquire an expertise in software used in industry. Choice between : 1/ Aeronautics 2/ Automotive

Syllabus:

PROJ 1 : Aircraft Preliminary Design Project

Knowing performance specifications of a given aircraft such as :

- Mission type (civil, military), number of passengers
- Range
- Endurance
- Rate of climb
- Maximum ceiling
- Landing and take-off distances

Design of an aircraft using :

- Aerodynamic calculations
- Engine (propulsion)
- Weight and balance (structure)
- General arrangement drawing (structure)
- Performance and Control

The project will be supervised by aircraft engineers.

Software used : excel, CATIA...

Or :

PROJ 2 : Automotive Preliminary Design Project

- Dynamic and Safety Design Product (i.e. on a Porsche Carrera, on a Monospace)

Specifications and content of the project to be announced.