

**4 WEEKS**  
AT CLA  
UNIVERSITÉ  
DE FRANCHE-  
COMTÉ  
**BESANÇON**  
DIJON - BELFORT



© Unsplash

# MICRO, NANO & SMART TECHNOLOGY

## For industrial applications

The Center for Applied Linguistics (CLA) of the University of Franche-Comté in Besançon has collaborated with Campus France and the Graduate School EIPHI of the Federal University of Bourgogne Franche-Comté to provide a new program of the French + Sciences in Besançon, Dijon and Belfort. This program will be offering language, cultural and scientific immersion focusing on micro and nanotechnology for industrial applications.



Designed for English-speaking students, this program includes classes in French as foreign language (FLE) from A1 to B2 level, meetings with researchers, visit of laboratories such as FEMTO-ST and ICB organized by PhD students, and a wide range of excursions and cultural activities.

centres to develop a program of practical foreign language courses based on linguistics research applied to the science of education and active learning methods.

CLA, founded in 1958, was one of the first university language

6, rue Gabriel Plançon  
25000 BESANÇON  
tel. +33 (0)3 81 66 52 29  
fle-cla@univ-fcomte.fr



GET  
**16 CREDITS**  
WITH THIS  
PROGRAM



© Laboratoire FEMTO-ST



© Alain D'ORE, Bourgogne-Franche-Comté Tourisme

With 4,000 international students every year, CLA is the most important university language centre in France. It has been recognized with the highest grade of the label Quality FLE delivered by the French government.

The Graduate School EIPHI (standing for "Engineering and Innovation through Physical Sciences, High-technologies, and cross-disciplinary research") provides the training of the scientific part. It is based on seven top ranking international research laboratories: FEMTO-ST, ICB, IMB, UTINAM, ICMUB, IMVIA and LMB. EIPHI provides international Master and PhD programs covering thematic fields such as mathematics, physics, micro nanoscience and systems, computer science, mechatronics, as well as materials and energy. Their research activities can be fundamental or applied, and regularly produce a socioeconomic impact. The institutes rely on high-level technology, equipment and technological platforms.

The Bourgogne-Franche-Comté region is a French tech labeled region through three centers of excellence: HealthTech, IoT and FoodTech.



#### COURSE CONTENT

**30  
HOURS  
PER WEEK**

#### ■ French as a foreign language: 15 hours per week

- > Acquisition of oral and written communication skills;

- > Development of intercultural competence.

#### ■ Micro, Nano and Smart Technology: 15 hours per week

- > Introduction to 8 topics of scientific research at University of Bourgogne Franche-Comté;
- > Participation in tutorials and lab works;
- > Visits to state-of-the-art laboratories and meeting with

- researchers;
- > Cultural tours.

#### ■ Student performance will depend on 3 points:

- > Quality of the student's weekly journal and subsequent progress report;
- > Degree of participation in program activities;
- > Progress in French as a foreign language.

*Non-contractual program, subject to change. A minimum of 10 students is required.*

Duration

**4 WEEKS**



Location

**BESANÇON**  
**BELFORT** **DIJON**

**PERIOD:** January, June

French ⊕ Sciences & University housing

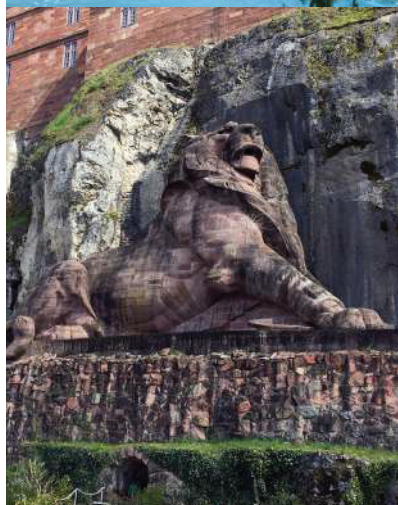
**€1,960**



# 4 WEEKS AT CLA UNIVERSITÉ DE FRANCHE- COMTÉ BESANÇON DIJON - BELFORT



© E. EME, CAGB



© Pixabay



6, rue Gabriel Plançon  
25000 BESANÇON  
tel. +33 (0)3 81 66 52 30  
fle-cla@univ-fcomte.fr

## WEEK

# 1

### MONDAY & TUESDAY

- > **Morning French class**
- > **Afternoon Challenges of Micro & Nano Systems:**  
This course addresses the challenges of the miniaturization of more and more complex and powerful systems. From the concept of nano-robots able to perform noninvasive surgeries, to smart Mechatronic systems that invade our daily life, nano and micro structures have a key role in the upcoming industrial revolutions. Understanding and mastering the manufacturing at such scales is an important challenge. Students will be visiting the Mimento technological platform.

### > Afternoon Non-linear fiber optics:

This is a very dynamic topic of research due to the wide range of possible applications, from high-bit-rate telecommunications to novel optical source development for material processing, environmental sensing and medicine. This short course will be covering recent advances in modern non-linear fiber optics, with a focus on novel optical frequency combs with a wide spectral range that can be extended to the mid-infrared. Those disruptive fiber optic instrumentations enable remote detection of volatile compounds and diagnosis of health pathologies. Visits of FEMTO-ST research facilities will be proposed.

### FRIDAY

- > **Morning French class**
- > **Afternoon Evaluation**

### SATURDAY

- > **All day Excursion to Haut-Doubs: Guided tour**  
Château de Joux, lunch at a typical Franche-Comté inn, boat trip on the Doubs River, and discovery of the Saut-du-Doubs waterfall near the Swiss Border.



### WEDNESDAY & THURSDAY

- > **Morning French class**

## WEEK

# 2

### MONDAY & TUESDAY

- > **Morning French class**
- > **Afternoon Green Energy for Mobility:**  
Committing to the energy transition and the reduction of greenhouse gas emissions requires new technological developments. Fuel cells and storage batteries are very promising alternatives to carbon-based energy sources. Increasing their competitiveness on the economic market is a priority issue in order to allow a large-scale use and the recycling of electric power sources, in the context of the expansion of the electric vehicle fleet and stationary applications. This course will be introducing the

concept of smart grids and focus on the design of complex multiphysics systems integrating hybrid electrochemical sources. Students will be offered a visit of FC-Lab and Thermal Energy Lab.

These limits become particularly relevant when simulating quantum systems and emulating neural networks. In this course we will introduce quantum information processing and neural networks and show that the two concepts share common denominators which are relevant for future hardware implementations.

### WEDNESDAY & THURSDAY

- > **Morning French class**
- > **Afternoon Neural Networks & Quantum Computing:**  
The digital electronic computer we got so used to in the past decades is reaching its performance maximum. Unfortunately, this is the consequence of fundamental physical hardware limitations and the restrictions of Turing computing.

### FRIDAY

- > **Morning French class**
- > **Afternoon Evaluation**

### SATURDAY

- > **All day Excursion to Lausanne (Switzerland)**

## WEEK

## 3

## MONDAY &amp; TUESDAY

> Morning **French class**> Afternoon **Smart & Green Mechanics:**

This course will address the design of innovative solutions for applications such as vibroacoustic control (NVH), Structural Health Monitoring (SHM), Shape Control, or Energy Harvesting for instance. Different subjects such as smart materials with multiphysic behaviors or embedded sensors and actuators in the field of acoustics, heat transfer, or electro-magnetics will be covered through a lecture, labwork and a visit of the S.MART technological platform.

France has always played a key role in the field of time-frequency metrology. In this course, we will present the basic tools, the state of the art and the main applications of this domain. Subjects such as oscillators and atomic clocks (in the microwave and optics domains), quantum phenomena and superradiance will be covered.

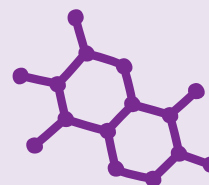
## FRIDAY

> Morning **French class**> Afternoon **Evaluation**

## SATURDAY

> All day **Excursion to Dijon**

© Adobe Stock



## WEDNESDAY &amp; THURSDAY

> Morning **French class**> Afternoon **Time-Frequency Metrology & Quantum Physics:**

## WEEK

## 4

## MONDAY &amp; TUESDAY

> Morning **French class**> Afternoon **Innovative Drugs & Nano-technologies:**

Recent years have witnessed unprecedented growth of research and applications in the area of Nanoscience and Nanotechnology. There is increasing optimism that nanotechnology, as applied to medicine, will bring significant progress in the diagnosis and

treatment of several diseases. Anticipated applications in medicine include drug delivery, diagnostics, cell therapy and production of biocompatible materials. This course presents the state of the art of this domain and the research conducted locally. A visit of ICB research facilities related to this topic will be offered.

## WEDNESDAY &amp; THURSDAY

> Morning **French class**

## &gt; Afternoon

**Wednesday:**

Micro, nano & soft Robots laboratory visit.

**Thursday:**

Clean Room laboratory.

## FRIDAY

> Morning **French class**> Afternoon **Evaluation**