UNIVERSITÉ DE TOULON

2017/18

# HANDBOOK OF RESEARCH

## UNIVERSITY OF TOULON (UTLN)

Service des Relations Internationales
Campus La Garde, Bât. Le Béal 2
Phone: +33494142044 • E-Mail: sri@univ-tln.fr

# TABLE OF CONTENTS



Last updated on 06/29/2017

# WORD OF THE PRESIDENT OF THE UNIVERSITY

*The impact and global outreach of the University of Toulon's research activity is deeply rooted not only in a strong internal and external thematic coherence but also in a determined research policy focused on "Mediterranean Societies and Marine Sciences", a strategic view shared by our many partners in industry and research.*

**Éric BOUTIN**
President of the University

# THE UNIVERSITY OF TOULON

# LOCAL AND GLOBAL OUTREACH

Located in the Provence-Alpes-Côte d'Azur region, the city of Toulon is the center of an urban area of 560'000 inhabitants and the capital of the Department of the "Var", the name of the river which used to flow along its eastern boundary.

In a unique way, Toulon combines a rich Provençal and Haussmannian heritage in a Mediterranean ambience with a strategic ambition for education, science and technology. With its 10'000 students from over 90 countries and more than 300 research scientists, UTLN is a key player not only in providing a response to the region's local economic needs and to the global demand of the international labor markets by offering its students a powerful training for the proactive participation in a constantly evolving and accelerating scientific and economic environment, but also in developing, at the forefront, research activities and industrial partnerships, in particular in the prominent field of the Marine Sciences.


The implementation of these cooperative actions is based, on one hand, on a dense regional fabric of institutional and industrial collaborators and, on the other hand, on an international policy which consists in developing UTLN's global outreach and strategic positioning by means of a broad range of effective joint ventures.

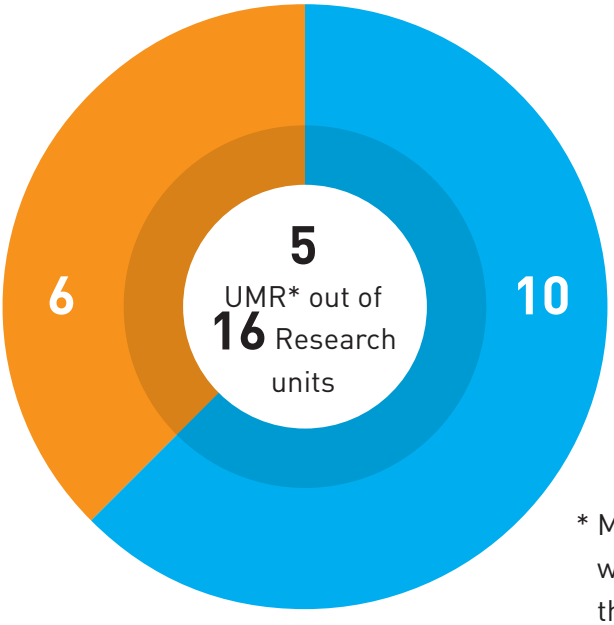
Besides its active membership in several international consortia like, for example, the consortium of over 50 French higher education and research institutions developing the Franco-Vietnamese University of Science and Technology of Hanoi or the consortium of over 80 Euro-Mediterranean universities TETHYS, UTLN, together with the Vietnam National University, also runs the international research institute ERIPOLE whose activity in the Marine Sciences not only profits from the bachelor and master degrees which UTLN exports to Hanoi, but also from the many jointly supervised doctoral theses and the patents filed in the corresponding research areas.

Based on the cooperation with more than 100 Erasmus partners and over 70 extra-European academic institutions, UTLN's global outreach also heavily resides on its consistent investment into its "Visiting Professor" program enabling incoming mobilities of several weeks, mostly from the US and Canada, for more than 50 selected research scientists per year whose research activities underline the strategic orientation of UTLN's research policy.

# RESEARCH AT UTLN
## FACTS AND FIGURES

### RESEARCH UNITS

**6** Research units in Human and Social Sciences

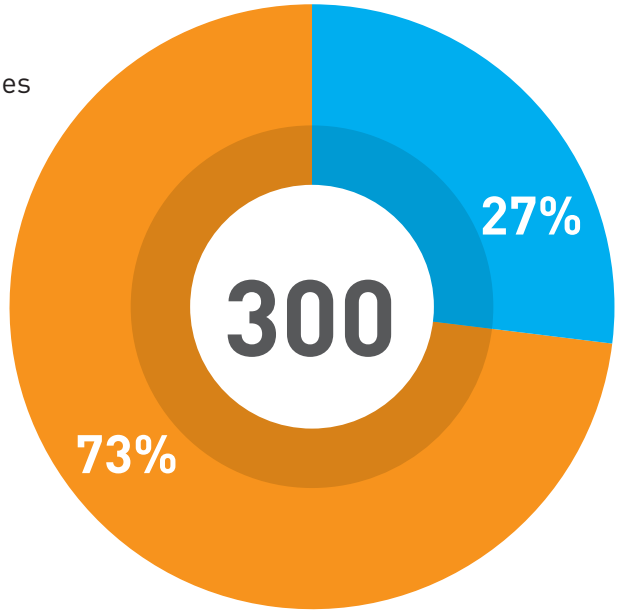



**10** Research units in Science and Technology

* Mixed Research Units: jointly with Aix Marseille University and the National Center for Scientific Research (CNRS)

### RESEARCHERS

**300** Researchers in **32** disciplines




**27%** University Professors

**73%** University Lecturers: **25%** of them are authorized to direct research

Over **50** foreign researchers per year invited in our ''Visiting Professor'' mobility program

# RESEARCH AT UTLN
# FACTS AND FIGURES

## DOCTORAL SCHOOLS (EDs)

### ED 509

''Comparative Euro-Mediterranean Civilizations and Societies'' with over **120** PhD students (in 2016/2017)

### ED 548

''Sea and Sciences'' with over **80** PhD students (in 2016/2017)

**40** PhD defenses (in 2016/2017)

## PATENTS AND INVENTIONS

5

**5** Invention disclosure statements per year

3

**3** Patents filed per year

## STARTUPS

**14** Projects filed (2012-2016) - **9** of which are developed or bought - in the following fields:

- Education: **1**
- Energy: **3**
- Health and Sports: **3**
- Robotics: **1**
- Biology: **1**

# THEMATIC AREAS OF RESEARCH

Research at UTLN is structured around its strong identity of **Mediterranean Societies and Marine Sciences** and draws on 3 thematic areas.

## ◈ MEDD - Sea, Environment, and Sustainable Development

Research activities in this thematic area are at the heart of the local economy, driven by its geographical location, thanks to close partnerships which have been developed between UTLN and the Pôle Compétitivité Mer Méditerranée, with the town of Toulon for which the sea has always been one if its central concerns, and with economic players like the DCNS Group and neighboring research bodies like the Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER).

This thematic area enables the promotion of transverse activities between exact sciences (Physics, Chemistry, Biology, Mathematics, Engineering, Sports) and Social and Human Sciences (Humanities, Economics, Management, Law, ICT).

The protection of the environment, the development of technologies in compliance with new environmental standards and the sustainable management of risks and the coastline remain research priorities.

# THEMATIC AREAS OF RESEARCH


## ESMed - Exchange and Societies in the Mediterranean

This area of research brings together all of UTLN's research units in the field of Humanities and Social and Human Sciences around a very topical issue concerning the complex movements of communities in the Euro-Mediterranean societies. Religious identities, links - sometimes ambiguous - between religion and politics, cultural diversity as a source of creativity and tension, the importance of the media and digital technology in the dissemination of knowledge, the linguistic dimension, the game played by nation states and international organizations, and comparative law are all subjects which are studied in this thematic area.


## INP - Information, Digital Technology, and Prevention

This thematic area addresses, through a theoretical, conceptual and methodical approach, all issues related to signal processing, coding, linguistics, modelization, big data management, and risks and prevention with all kinds of societal applications (surveillance of animals, of invasive species and of environmental and light pollution, health monitoring and consulting services).

# RESEARCH UNITS

## CPT - Center for Theoretical Physics

Research is focused on: Propagation and Transport in Mesoscopic Systems; Study of Semiconductors, Graphene; Models of Fundamental Interactions; Theory of Extreme Values.

***Example applications:***

- Developing models based on the theory of extreme values for climate science and finance
- Studying propagation and transport in wave guides
- Studying transport properties in open quantum systems out of equilibrium

**www.cpt.univ-mrs.fr**

## IMATH - Toulon Institute of Mathematics

The activities of this research unit are structured around 3 themes: Applied Linear Analysis (optimization, calculus of variations); Numerical Modelization; Computer Science and Applied Algebra (coding and cryptography).

***Example applications:***

- Developing models for metamaterials which are physically appropriate and accessible to numerical calculation
- Developing massive parallel simulations of complex flow - 3D modeling of blood vessels

**imath.univ-tln.fr**

# RESEARCH UNITS

## IM2NP - Provence Institute for Microelectronics, Materials, and Nanosciences

Research is developing around materials, nanosciences, and micro- and nanoelectronics. This unit includes 4 teams specializing in: Microsensors; Signals and Systems; Nanostructuring; Design of Integrated Circuits.

***Example applications:***

- Developing sensors for high energy radiation in the area of photoluminescent materials
- Developing new multifunctional materials for gas sensors and for devices degrading chemical pollutants
- Developing passive trajectography of a moving objects (underwater environment)

**www.im2np.fr**

## MAPIEM - Polymeric Materials, Interfaces, and Marine Environment

Research is focused on polymer-based material durability in a marine environment, mainly applied to heterogeneous materials (coatings, composites, etc.) with a specific functionality (anticorrosion, antifouling, reduced hydrodynamic drag, etc.).

***Example applications:***

- Developing new coatings with antifouling, nontoxic or environmentally friendly properties: application in temperate and tropical environments, application to light materials such as magnesium or aluminium
- Developing antifouling paint

**mapiem.univ-tln.fr**

# RESEARCH UNITS

## MIO - Mediterranean Institute of Oceanography

Research concentrates on the observation of the marine environment (open-ocean, continent-ocean and atmosphere-ocean interfaces).

The researchers on the Toulon site belong to the teams doing research in physical, coastal and near shore oceanography and in environmental chemistry. They work specifically on physics and on the sounding of the natural atmosphere-ocean environment.

***Example applications:***

- Studying the management of accidents occurring at sea (oil slicks, rescue operations)
- Developing well and sea echo propagation models
- Developing HF-radar observation systems

**mio.pytheas.univ-amu.fr**

## PROTEE - Transfer and Exchange Processes in the Environment

Bringing together expertise in the fields of the earth sciences, the sciences of the universe, analytical chemistry, biology, and physics, the PROTEE reseach unit is organized around 3 key areas: Processes of transfer of chemical species in the environment; Impact of transfers on biological communities and on mineral environment; Development of environmental instrumentation.

***Example applications:***

- Studying plankton covering the complete spectrum from viruses to larvae in order to provide a quantitative description of the pelagic ecosystem components
- Studying the impact of microplastics on health and the functioning of ecosystems in the Mediterranean

**protee.univ-tln.fr**

# RESEARCH UNITS

## HANDIBIO - Biomodelization and Engineering for Disabilities

The projects in this unit develop around 3 thematic areas: Biomechanic analysis of movement, modelization and ergonomy for rehabilitation, prevention of musculoskeletic disorders, and health and sports; Exercise physiology and nutrition; Interface brain/smart machine and the tracking of eye gaze for electric wheelchair control.

***Example applications:***

- Developing biomechanic indicators in order to assess motor skills
- Designing a robotic assistance which enables patients with disabilities to make use of their motor skills and brain abilities
- Developing new ergonomic methodologies

**www.handibio.fr**

## LAMHESS - Human Motor Ability, Education, Sports and Health

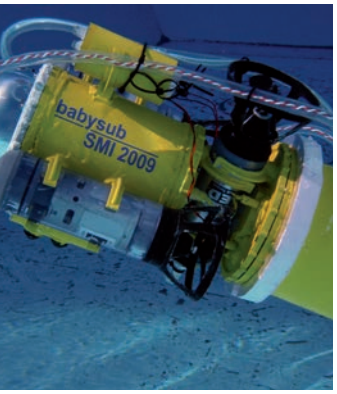
This unit's research topics concern human motor skills with two main ranges of application: Performance and Health.

***Example applications:***

- Studying the energetic and mechanical cost of wheel chair powering for athletes with disabilities
- Studying physiological and biomechanical indicators on performance during trail running races
- Studying the neuromuscular function in cystic fibrosis

**www.unice.fr/ufrstaps/lamhes**

# RESEARCH UNITS




## COSMER - Robotic and Mechanical Systems Design

Based on skills acquired in the field of mobile robotics, eco-design and the optimization of mechanical systems, research work concentrates on: Development of mobility and autonomy of robotic systems in aquatic and terrestrial environments; Ecodesign in mechanics and optimization of complex systems.

***Example applications:***

- Designing a cost effective vessel for the maintenance of offshore wind farms in order to increase the number of working days at sea
- Designing a decision support tool for the eco-design of products in order to reduce energy consumption and air emissions while increasing recycling flows

**cosmer.univ-tln.fr**

## LSIS - Information and Systems Sciences

Research builds on: Computer Science (learning representation, artificial intelligence); Automation (system evaluation and control, tracking, human eyesight and movement); Signal processing (time-frequency analysis, optimization) and image processing (fusion, unmixing, stereovision).

***Example applications:***

- Developing a new climate control system to optimize plant growth in greenhouses
- Signal processing and analysis for biomedical applications
- Monitoring and interpreting air and marine sound sources (cetacea, drone, chiroptera)

**www.lsis.org**

# RESEARCH UNITS


## DICE - International Law, Comparative Law, and European Law - CDPC Jean-Claude Escarras

This team specializes in Franco-Italian law and brings together skills in the field of comparative law in the following areas: Public law; Private law; History of law.

***Example applications:***

- Comparative study of constitutionality as a priority issue with similar existing legal proceedings in Italy and Spain
- Studying comparative law in cases when it is resorted to by judges

**cdpc.univ-tln.fr**

## CERC - Center of Studies and Research in Litigation

This unit is organized around 2 key areas: Methods and foundations for resolving public and private disputes; Theoretical issues related to litigation, in particular when interpreting or translating legal documents.

***Example applications:***

- Studying social and economic issues which are at stake in port areas
- Studying the reconciliation between equality and freedom: interpersonal equality and equal rights
- Inserting and translating the term “value” in the legal language

**cerc.univ-tln.fr**

# RESEARCH UNITS

## LEAD - Economics Applied to Development

Research work is organized around 3 key areas: Urban economy and spatial economy: analysis of immigration, sustainable town development and management of coastal areas; Regional development: economic mechanisms in the development process, social and economic inequalities in local labor markets; Trade and international finance applied to development: macro-regional analysis of the territories in the area of trade.

***Example applications:***

- Studying the competition of the maritime activities of the port of Toulon
- Studying the economic activities which are related to the use of the coast and the sea
- Developing a program on the migrations of retirees

**lead.univ-tln.fr**

## GRM - Management Research Group

Research is organized around 3 thematic areas: Corporate social responsibility; Responsible management: development, innovation, and management of human resources; Consumer's behavior and brand management.

***Example applications:***

- Studying the significance of business initiatives in terms of sustainable development and social responsibility
- Studying the marketing impact due to corporate spelling and typography shortcomings

**www.laboratoire-grm.fr**

# RESEARCH UNITS

## BABEL

The activity of this unit is structured around 3 key areas: Languages: semantics, enunciation; Literature: Euro-Mediterranean writings, the Middle-Ages and early modern literature, the significant role played by books in culture; Civilizations and societies: the contemporary English-speaking world, women and gender.

***Example applications:***

- Publications (Italian post-colonialism, public governance in Britain since 1977) and conferences
- Developing a dialogue between health care providers and Humanities specialists in order to promote a joint reflection in the areas of Human and Social Sciences and Medicine (publication of a collective work: "Le Sein: des mots pour le dire" - The Breast: the words to say it)

**babel.univ-tln.fr**

## I3M - Information, Environment, Media, and Mediation

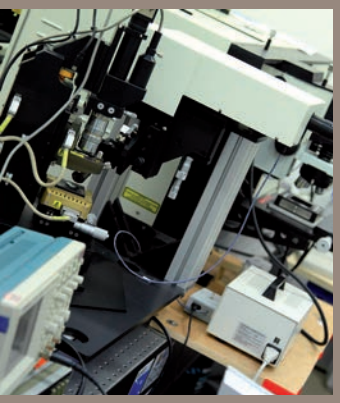
This unit studies the transformations which have occurred in the organization of our society: Industrialization of human activities; Individualization of human relations; Mutation of social and professional identities; Reconfiguration of cultures.

***Example applications:***

- Qualitative and quantitative study of the positive and negative implications brought by digital applications in relation to learning support in school education
- Developing software training modules for patent analysis

**i3m.univ-tln.fr**

# TECHNOLOGICAL PLATFORMS



## Nano-analysis

The high performance microscope AFM-Raman enables researchers to study the physical and chemical proprieties of materials at the nanoscale level.

**www.univ-tln.fr/Nano-Analyses.html**

## BioTech Services

This platform represents the know-how in the area of molecular biology, from the extraction of biomolecules to the bioinformatic analysis of results.

**www.univ-tln.fr/BioTechServices.html**

## Material Engineering Services

This platform has been drawing on expertise for over 15 years in the area of anti-corrosion protection by using paint and in the field of characterization of materials.

**www.univ-tln.fr/Service-Ingenierie-des-Materiaux-SIM.html**

## Fast Prototyping Machine MAQ 3D

Drawing from new prototyping and post-processing technologies, this platform allows for the production of small series and the manufacturing of parts featuring high standard mechanical characteristics.

**www.univ-tln.fr/MAQ-3D.html**

# DISSEMINATION OF RESEARCH


## ◈ "Journées Scientifiques de l'UTLN"

The "Journées Scientifiques de l'UTLN" (12th edition in 2018), an annual scientific forum, aims to present research activities carried out at UTLN to the researchers, to the teaching staff and to the students from UTLN, to neighboring or remote universities, to businesses and to the public in general. Foreign researchers as well as industrial and institutional partners are invited to attend, over 2 days, 15 conferences supported by the research units and financed by UTLN.

**http://js2017.univ-tln.fr**

## ◈ Participation in scientific events

For the ''Cité des Sciences et de la Mer'', an event organized by the Communauté de Toulon to host the America's Cup 2016, 7 research units from UTLN provided demonstrations and conferences to the public and to industrial and institutional players.

**www.univ-tln.fr/Video-America-s-Cup-nous-y-etions.html**

## ◈ Media coverage

Interviews from UTLN researchers are made available by the Communication and the IT departments on the UTLN website, in the local, regional and national newspapers, and on TV. In 2016, more than one press article or TV report per month was dedicated to UTLN's research activities.

# OUR INDUSTRIAL PARTNERS AND OUR STARTUPS

## Our industrial partners

UTLN has a strong relationship with a large network of institutional and industrial partners from big corporate companies to small and medium-sized businesses. This network, which covers a significant part of the national territory and of the Provence-Alpes-Côte d'Azur region, is particularly developed at an international level and includes key players in R & D, production, and application in the fields of defense, energy, and the environment.

An important activity of skill and expertise transfer from UTLN's research units to the industry develops - via Convention Industrielle de Formation par la Recherche (CIFRE) PhD research work, collaborative projects, research services and licensing of patents - as a result of UTLN's close partnerships with the social and economic fabric.

**Major partners in defense and energy:**

- DCNS - world leader in naval defense
- AIRBUS including its subsidiary AIRBUS Helicopters - world leader in the manufacturing of civil and military helicopters
- La Direction Générale de l'Armement (DGA) - government defense procurement and technology agency responsible for the program management, development and purchase of weapon systems for the military
- Constructions Industrielles de la Méditerranée (CNIM) - the CNIM group, an engineering company operating at international level
- Communication et Systèmes (CS) - systems designer and integrator
- Direction Générales des Douanes et Droits Indirects (DGDDI) - customs and excise services
- Commissariat à l'Energie Atomique (CEA) - alternative energies and atomic energy commission
- ENGIE - a multinational electric utility company

# OUR INDUSTRIAL PARTNERS AND OUR STARTUPS

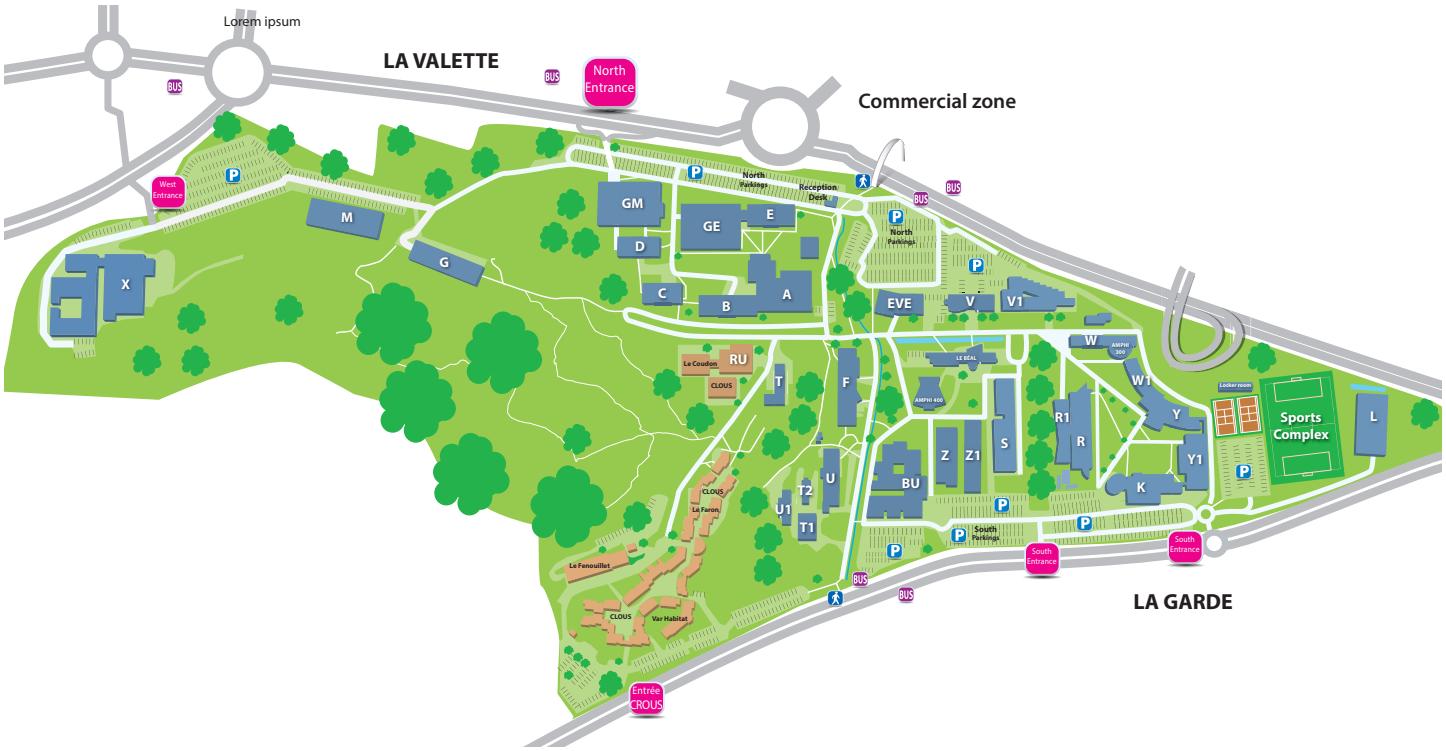
**Major partners in the environment:**

- Le Centre National d'Etudes Spatiales (CNES) - national center for space studies
- THALES Alenia Space - Europe's largest satellite manufacturer
- Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER) - French research institute for exploitation of the sea
- SUEZ-Environment -
- Office National d'Etudes et de Recherches Aérospatiales (ONERA) - French national aerospace research center

## Our Startups

Incubateur PACA EST (IPE), founded in 2001, is UTLN's favorite partner for business creation. Several startups originating from research results achieved at UTLN units were born within IPE.

# MAP OF
# LA GARDE CAMPUS



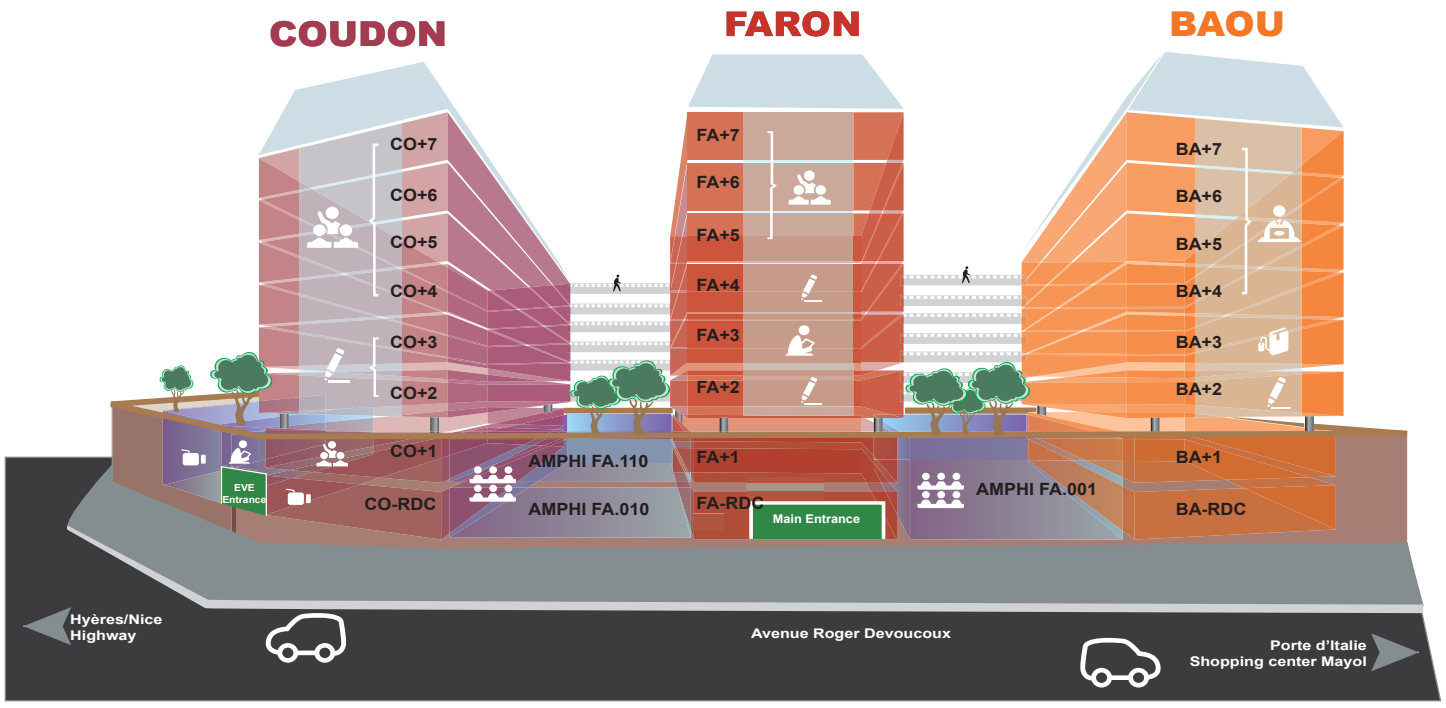

## FACULTIES and departments

- **Bât. A, B, C, D, E, F, G**
  The Institute of Technology (IUT)
- **Bât. K** Faculty of Physical Education and Sports Studies (STAPS)
- **Bât. S** Var's Public Institute for Training in the Health Care Professions (IFPVPS)
- **Bât. U** Faculty of Science and Technology
- **Bât. X-M** SeaTech School of Engineering
- **Bât. V1** Continuing Education Department (FTLV)
- **Bât. Y** Faculty of Literature and Humanities
- **Bât. R1** Doctoral School ED 548 "Sea and Sciences"

## RESEARCH UNITS

- **Bât. R** PROTEE, IM2NP
- **Bât. X** LSIS, MAPIEM, MIO
- **Bât. M** COSMER, IMATH
- **Bât. K** LAMHESS
- **Bât. W1** BABEL
- **Bât. U** CPT
- **Bât. Z1** HANDIBIO
- **Bât. R1** Directorate for Research and Projects

# MAP OF TOULON CAMPUS




## FACULTIES and departments

- **Bât. P** Faculty of Law
- **Bât. PI** Faculty of Economics and Management
- **Bât. PI** Ingémédia Faculty of Information and Communication
- **Bât. PI** Institute of Business Administration (IAE)
- **Bât. P** Doctoral School ED 509 "Comparative Euro-Mediterranean Civilizations and Societies"

## RESEARCH UNITS

- **Bât. P** CDPC-DICE
- **Bât. P** CERC
- **Bât. PI** I3M
- **Bât. PI** LEAD
- **Bât. PI** GRM

We look forward to seeing you here, with us!

UNIVERSITÉ DE TOULON

Service des Relations Internationales

www.univ-tln.fr