



Student Handbook

Studying at The University of Caen Normandie
A Guide for SpaceMed Students



Academic year
2026 - 2027



UNIVERSITÉ
CAEN
NORMANDIE



Imprint

Erasmus Mundus Joint Master Degree on Physiology and Medicine of Humans in Space and Extreme Environments (SpaceMed)

Université de Caen Normandie

UFR Santé
2, rue des Rochambelles
14 000 Caen

Contact

E-Mail: spacemed@unicaen.fr
Phone: +33 (0)2 31 56 82 66

Production

Caroline OZOUF

Design Concept

Charité - Universitätsmedizin Berlin & UNICAEN

Visual Branding

Cédric GUERN - UNICAEN

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Université de Caen Normandie 2026

Table of Contents

About the Student Handbook

How to use this Handbook ?	05
What You'll Find in This Handbook ?	05

Part 01

WELCOME

1.1 The University of Caen Normandie...	08
1.2 The SpaceMed Program.....	11
1.3 The SpaceMed Steering Committee Members.....	13
1.4 The SpaceMed Managing Team at Unicaen.....	14
1.5 The SpaceMed Teaching Team at Unicaen.....	14
1.6 Key Site and Contacts for SpaceMed Students.....	15

Part 02

PROGRAM & STRUCTURE

2.1 Study Structure.....	20
2.2 SpaceMed Student Agreement.....	20
2.3 Semester 1 · Overview of the Modules and Assessments.....	21
2.4 Exams and Grades.....	37
2.5 IT services.....	38
2.6 Student card - Leocarte.....	39
2.7 Introduction to Zimbra and eCampus	40

Part 03

ADDITIONAL RESOURCES

3.1 Getting started in Caen.....	42
3.2 Frequently Asked Questions (FAQ)...	49

About The Student Handbook

How to use this Handbook

Dear SpaceMed students,

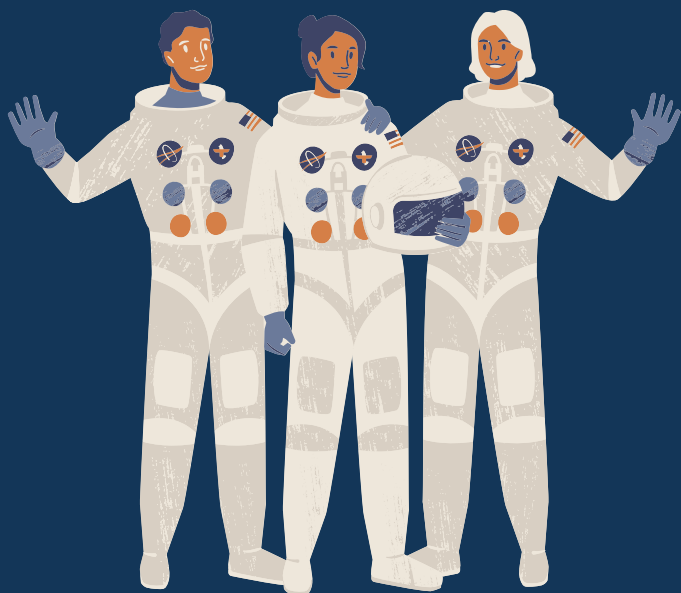
Welcome to the first semester of the SpaceMed Program at the Université de Caen Normandie! This booklet provides information that you might need during your time in Caen to complete the semester. We are always looking to improve, so please do not hesitate to point out mistakes, suggest changes and improvements, and raise constructive criticism regarding this handbook.

Your SpaceMed Team from Caen

What You'll Find in This Handbook

- **Getting started**
- **Program structure**
- **Course Content**
- **Helpful information**

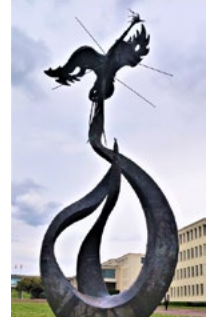




01

Welcome

1.1 The University of Caen Normandie



A HISTORIC MONUMENT

Founded in 1432 by King Henry VI of England, the University of Caen Normandy (UNICAEN) can be considered as the third oldest English university after Oxford and Cambridge". UNICAEN has overall grown strong of nearly 600 years of experience in academic training and research. Totally destroyed in 1944 by the bombing raids of the Second World War, the university rose from the ashes like a phoenix. Reconstruction of the university began in 1948 under the authority of Rector Pierre Daure, and the new campus was inaugurated in 1957 in the presence of the Minister of Education and other leading figures from around the world. The Rector commissioned architect Henry Bernard to build the new campus in the style of modern Anglo-Saxon campuses.

Redesigned with such a futuristic vision, the University became one of the most modern universities in Europe. In 2012, some of its buildings were classified as historical monuments.

REGIONAL COMMITMENT

Since the mid-50s, UNICAEN has grown to become the largest University center in Normandy, with 6 campuses in Caen urban area and 5 remote campuses in the region (Calvados, Manche and Orne departments). **It is home to 33 000+ students, included 9% international students of 115 nationalities.**

Did you know that the University of Caen Normandie has 11 different campuses?





SCIENTIFIC EXCELLENCE

- Cooperation with ENSICAEN (National School of Engineering), CYCERON (biomedical imaging platform), GANIL (National Large Heavy Ion Accelerator), CHU (University Hospital), CLCC François Baclesse (Regional Cancer Care Center)
- A modern unit for health research and academic training
- Local entities involved in academic training, research and culture. The evolution of staff capacity and the development of research units led to the construction of other campuses in Caen and of 6 remote sites across the region.



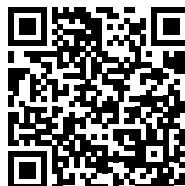
PFRS (Health Faculty) · Campus 5



THE “BIENVENUE EN FRANCE” LABEL: A 3RD STAR FOR THE UNIVERSITY OF CAEN NORMANDIE

The University of Caen Normandie has been awarded the 3rd star for the prestigious “Bienvenue en France” label, the highest possible distinction. This recognition, bestowed by Campus France, rewards UNICAEN permanent efforts and improvements in welcoming international students.

Discover the University of Caen Normandie in video :



1.2 The SpaceMed Program

The Erasmus Mundus Joint Master in Physiology and Medicine of Humans in Space and Extreme Environments (SpaceMed) was launched in September 2024, offering a unique integrated inter- and multidisciplinary study on the effects of extreme environments, particularly spaceflight, on humans. The curriculum places a strong emphasis on hands-on activities in state-of-the-art laboratories and on field studies, including spaceflight analogues (i.e., parabolic flights, Antarctic habitats, experimental bed rest studies, etc.), and extreme environments, such as those experienced at high altitude, underwater, and in hot and cold, dry and humid environments.

Semestre 1

- Basic human physiology, with emphasis on extreme environments.
- Hands on activities in research and clinical laboratories
- Practical demonstrations with associated partners (e.g., parabolic flight)
- Ethics in research
- Data analysis
- Statistical procedures

Semestre 2

- Advanced knowledge of spaceflight-related specialised areas
- Advanced knowledge of limits of human performance in extreme conditions on Earth
- Advanced research methods for spaceflight
- Advanced data processing and statistical analysis techniques
- Practical activities in research and industrial laboratories

Semestre 3

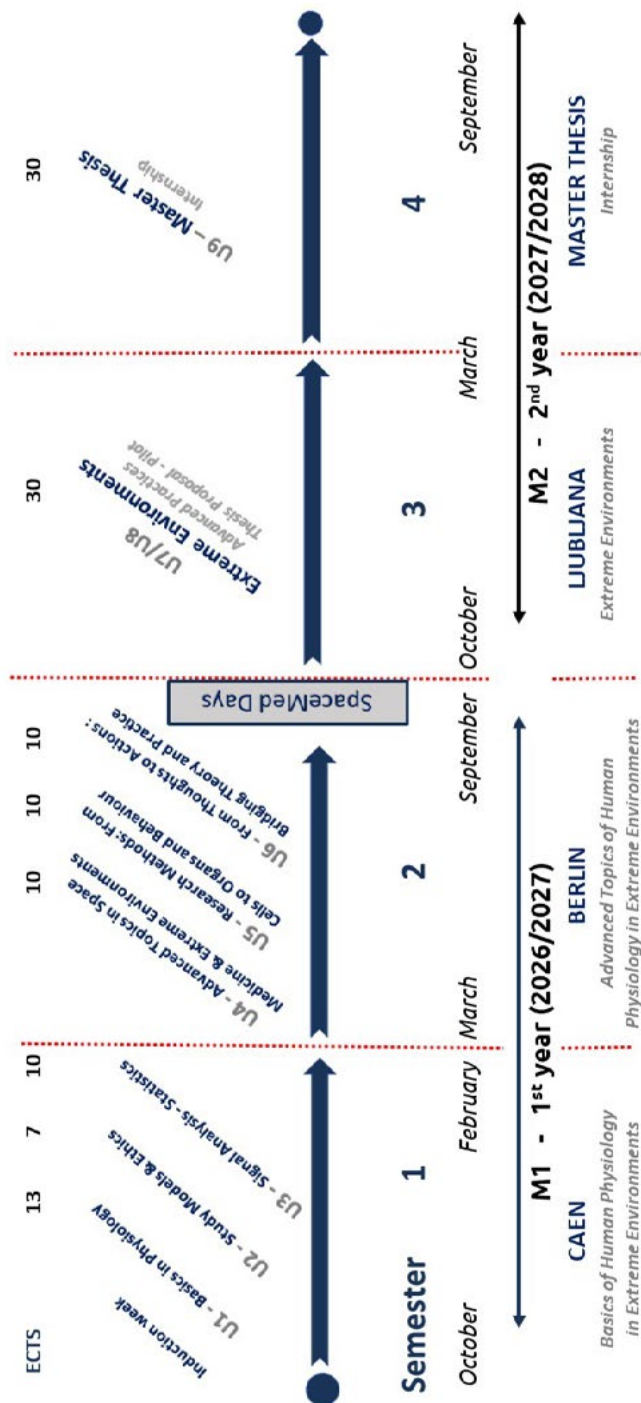
- Human habitats in extreme environments
- Spaceflight-associated musculoskeletal atrophy
- Spaceflight-associated cardiovascular deconditioning
- Circadian rhythms, sleep and nutrition
- Space Ergonomics, including human-robot interaction
- Pilot studies (bedrest, countermeasures, hypoxic confinement, isolation etc.)



Semestre 4

Students will complete a six-month research project or industrial placement. The culmination of all semesters will lead to the awarding of a Master Thesis.

Programme structure 2026/2028



1.3 The SpaceMed Steering Committee Members



Prof. Pierre DENISE

SpaceMed Coordinator (until
September 30th 2026)
E-Mail : pierre.denise@unicaen.fr



Prof. Gaëlle QUARCK

SpaceMed Academic coordinator
SoaceMed Coordinator (from
October 1st 2026)
University of Caen Normandie
E-Mail: gaelle.quarck@unicaen.fr



Prof. Alexander STAHN

SpaceMed Academic coordinator
Charité Universitätsmedizin, Berlin
E-Mail: alexander.stahn@charite.de



Prof. Igor MEKJAVIC

SpaceMed Academic coordinator
Mednarodna podiplomska šola
Jožefa Stefana at Institut Jožef
Stefan, Ljubljana)
E-Mail: igor.mekjavic@ijs.si



Annika BAUER

SpaceMed Student's Representative
Intake #1 - 2024-2026
E-Mail: annikabauer999@gmail.com



Caroline OZOUF

SpaceMed Administrative Coordinator
E-Mail: caroline.ozouf@unicaen.fr



Prof. Thomas FRERET

SpaceMed Local Academic coordinator
University of Caen Normandie
E-Mail: thomas.freret@unicaen.fr



Dr. Katharina BRAUNS

SpaceMed Local Academic coordinator
Charité Universitätsmedizin, Berlin
E-Mail: katharina.brauns@charite.de



Dr. Ursa CIUHA

SpaceMed Local Academic coordinator
Mednarodna podiplomska šola
Jožefa Stefana at Institut Jožef Stefan,
Ljubljana)
E-Mail: ursa.ciuha@ijs.si



Kira GRUHLKE

SpaceMed Student's Representative
Intake #2 - 2025-2027
E-Mail: kiragruhlke@gmail.com

1.4 The SpaceMed Managing Team at UNICAEN



Prof. Gaëlle QUARCK

SpaceMed Academic coordinator

E-Mail: gaelle.quarck@unicaen.fr



Caroline OZOUF

SpaceMed Administrative Coordinator

E-Mail: caroline.ozouf@unicaen.fr

1.5 The SpaceMed Teaching Team at UNICAEN



Prof. Pierre DENISE

SpaceMed Coordinator (until
September 30th 2026) +

Coordinator U1-EC3

E-Mail: pierre.denise@unicaen.fr



Prof. Damien LANEELLE

Coordinator U1-EC1

E-Mail: damien.laneelle@unicaen.fr



Dr. Nicolas BESSOT

Coordinator U1-EC2

E-Mail: nicolas.bessot@unicaen.fr



Dr. Antoine LANGEARD

Coordinator U1-EC4

E-Mail: antoine.langeard@unicaen.fr



Prof. Gaëlle QUARCK

SpaceMed Coordinator (from
October 1st 2026)

Coordinator U1-EC5 & U2-EC1

E-Mail: gaelle.quarck@unicaen.fr



Dr. Gilles CLEMENT Coordinator
U1-EC6

E-Mail: gilles.clement@unicaen.fr



Dr. marion HAY

Coordinator U2-EC2

E-Mail: marion.hay@unicaen.fr



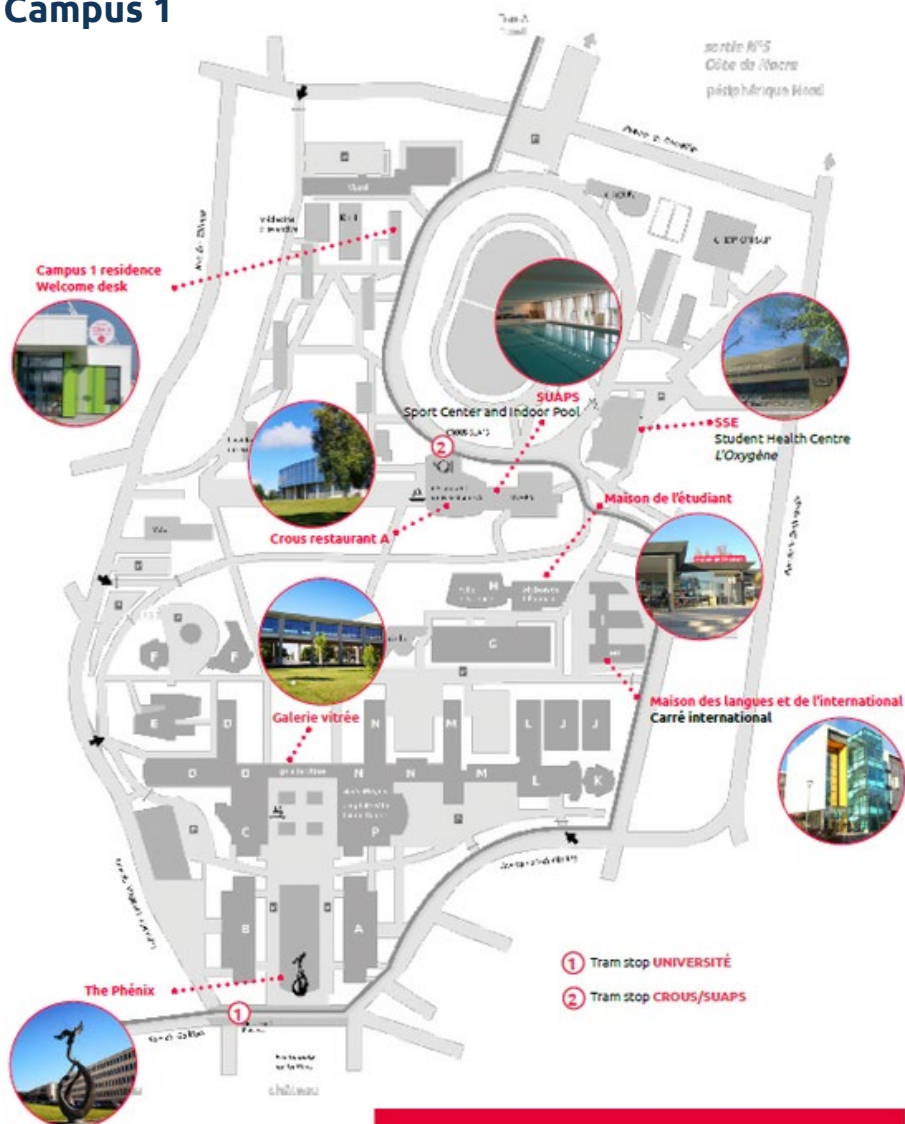
Dr. Olivier ETARD

Coordinator U3

E-Mail: olivier.etard@unicaen.fr

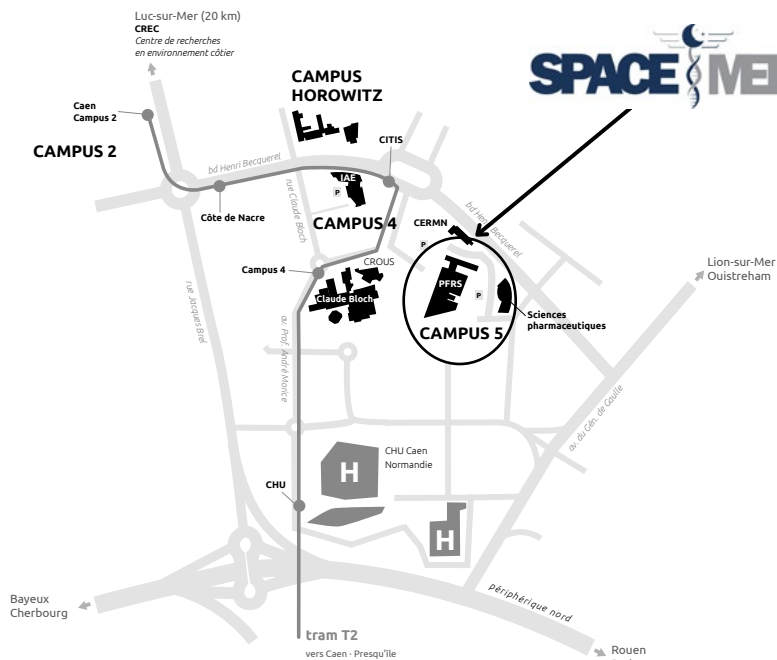
1.6 Key Sites and Contacts for SpaceMed Students

Campus 1



Find the maps of all UNICAEN campuses at
<https://www.unicaen.fr/universite/decouvrir/territoire/>

Campus 4 & 5



CAMPUS 4

- IAE - École universitaire de management
- bâtiment Claude Bloch :
 - COMUE - Normandie université
 - Média Normandie
 - Normandie incubation
 - IAE - école universitaire de management
 - ENSICAEN site B

CAMPUS 5

- PFRS - Pôle des formations & de recherche en santé :
 - UFR de Santé
 - École de sage-femmes
 - Formations paramédicales du CHU
 - BU Madeleine Brès
- **PC sécurité : 02 31 56 81 55**

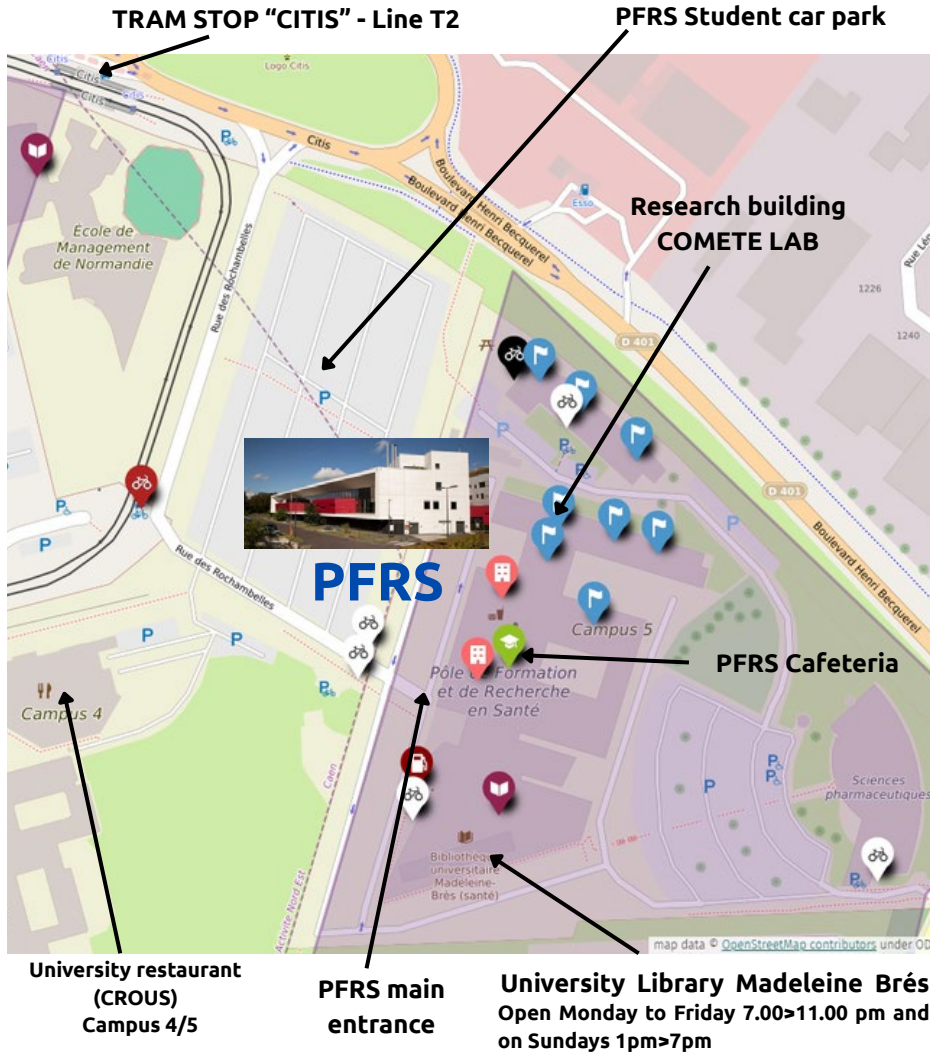
CAMPUS HOROWITZ

- CURB - Centre universitaire de ressources biologiques
- GANIL
- Laboratoire ETHOS
- Plateforme Cyceron : laboratoires de recherche
 - PHIND - ISTCT - NIMH
 - SEILIRM - ISTS - COMETE

Zoom on Campus 5 (PFRS - Health Faculty)

Address: 2, rue des Rochambelles - 14 032 CAEN

!! All your SpaceMed classes will be held in PFRS



Useful information if you are looking for a university library open on Saturdays, you can go to the Rosalind-Franklin Library located on Campus 2 (from 10.00 am to 7.00 pm - Tram stop "Campus 2 - Line T2")

Key administrative contacts

CAMPUS 5 - PERS



SpaceMed Office (Caroline OZOUF)

Room: PS1-050

Office hours: By appointment

E-Mail: spacemed@unicaen.fr / caroline.ozouf@unicaen.fr

Phone: +0033(0)2 31 56 82 66

CAMPUS 1 - MLI



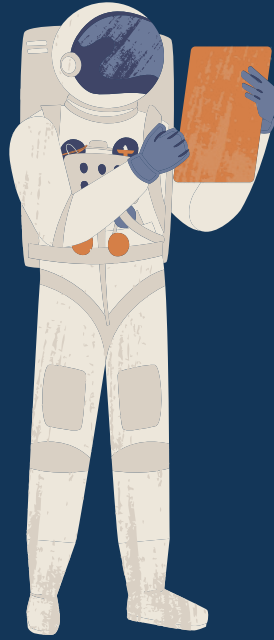
Carré International (International Office) PPMI- Mobility Programs Office (Sonia LEVAVASSEUR)

Room: PPMI- Mobility Programs Office (1st floor)

Office hours: By appointment

E-Mail: intl.mundus@unicaen.f

Phone: +0033(0)2 31 56 50 71



02

Program & Structure

2.1 Study Structure

You will be enrolled as a student at the University of Caen Normandie for 2 years. The teaching period in Caen will run from October 1st 2026 to the end of January 2027. The Caen examination period will run from February 1st to February 12th 2027. During the teaching period, there will be lectures every week from Monday to Friday (with some exceptions).

Key dates throughout Semester 1

- **Induction Days** : October 1st > October 2nd 2026
- **SpaceFlight Week** : October 19th > 22nd 2026
- **Special Spatial Week** : Study visit to Toulouse/Bordeaux-Mérignac
October 26th>30th 2026
- **Christmas Holidays (no classes)** : From December 19th 2026 to January 3rd 2027
- **Revision Week (no classes)** : January 25th>29th 2027
- **Exam period** : February 1st > 12th 2027

Throughout this semester there are public holidays in France. On those days no course activities will take place.

National holidays



Toussaint : November 1st 2026
Armistice : November 11th 2026
Christmas Day : December 25th 2026
New Year's Day : January 1st 2027

2.2 SpaceMed Student Agreement

During the Induction Week, you will be invited to read and sign the SpaceMed Student Agreement. The document defines the programme structure, the course requirements, the programme events, the research requirements, the insurance, the case of exclusion, the financial obligations and the academic rules.

2.3 Semester 1 - Overview of the Modules and Assessments

U1 : Extreme environments & Basics in Physiology - 13 ECTS

Module	Title	ECTS	Assessment	Assessment Date
U1-EC1	Hypo/Hyperoxia – Hypo/Hypercapnia – Hypo/Hyperbarism	3	Written Exam (100%) 1 hour	TBC
U1-EC2	Thermoregulation, Hypothermia, Hyperthermia	2	Written Exam (100%) 30 min	TBC
U1-EC3	Gravity and Accelerations	2	Written exam (100%) 1 hour	TBC
U1-EC4	Isolation & Confinement: Neuropsychological, Chronobiological and Functional Outcomes	2	Written exam (100%) 2 hours	TBC
U1-EC5	Hypoactivity/Sedentary behaviour/ Unloading Bearing Limbs	2	Oral presentation (50%) + report (50%) during the semester	TBC
U1-EC6	Effects on SpaceFlight on Humans	2	Written exam (100%) 1 hour	TBC

U2 : Study models & Ethics - 7 ECTS

Module	Title	ECTS	Assessment	Assessment Date
U2-EC1	Study & Experimental Models	3	Practical Evaluation during the semester (10%) + Written Exam (90%) 1 hour	TBC
U2-EC2	Ethics	4	Oral Presentation during the semester (20%) Written Exam (80%) 1 hour	TBC

U3 : Data Acquisition and Treatment, from Signals to Statistics - 10 ECTS

Module	Title	ECTS	Assessment	Assessment Date
	Data Acquisition and Treatment, from Signals to Statistics	10	2 Oral Presentations + poster session during the semester Written Exam (50%) 1 hour	Final Sudy Presentation Seminar TBC Written exam TBC

All the Units must be validated

U1

**Extreme
environments &
Basics in
Physiology**

Module U1-EC1 - Hypo/Hyperoxia - Hypo/Hypercapnia Hypo/Hyperbarism

Coordinator : Damien LANEELLE

Module Aims

1. To provide students with understanding of the physiological, psychological, and medical changes that are related to the different environmental conditions in human with a special attention to those involved in spaceflight and simulation (Long Term Bed Rest, parabolic flight and dry Immersion).
2. To acquaint the students with the challenges of supporting of human exposed to these environmental conditions.
3. To introduce to students the relevant methods (e.g., research proposal, experimental design, project management) required to perform a physiology experiment where these conditions are imposed or experienced.

General description :

This module covers the effects of changes in oxygen and carbon dioxide partial pressures as well as barometric pressure through the exposition to high altitude, subaquatic environment and confined spaces. The course will describe how the respiratory gases are involved in the main system regulations in the normal environment at sea-level. From this perspective the effect of altered conditions will be studied using the most classical expositions: high altitude for hypoxia and hypocapnia, deep-sea diving for hyperbaric hyperoxia as well as pure experimental conditions in research lab using normobaric changes in gas concentration.

Differences in regulation and reaction from an age and sex perspectives will also be studied in order to explain difference in adaptation (for instance to chronic hypoxia). Short- and long-term toxicity of the respiratory gases (mainly oxygen) will be reviewed as well as toxicity of the main gas used in conjunction of oxygen for deep-sea diving. Acute and chronic diseases related to environmental exposure will be reviewed.

- > *Lectures*: more details will be provided at the beginning of the semester
- > *Written Exam*: one-page essay at the end of the teaching term (1 hour)

Module U1-EC2 - Thermoregulation, Hypothermia, Hyperthermia

Coordinator : Nicolas BESSOT

Module Aims:

The objective of this module is to provide the theoretical knowledge necessary to understand the mechanisms of thermoregulation in hot and cold environments. It will provide the skills to measure thermal stress and the body's responses. Also, knowledge on acclimatization techniques in hot and cold environments will be addressed.

General description:

This module covers the neurophysiological systems of body temperature regulation. It presents the thermodynamic principles useful to the understanding of thermoregulation, as well as their implementation at the scale of the human body. It presents the tools for measuring temperature and thermal stress and their interpretations. Hypothermia and hyperthermia states will also be precisely described and a point on acclimatization processes will finally be made.

Syllabus:

1. Description of physical phenomenon: Thermodynamics: Electromagnetic radiation, conduction, convection, evaporation
2. Core temperature measurement: Central temperature measure, cutaneous temperature measure, sensors, example of data
3. Thermogenesis and thermolysis: autonomous temperature regulation (sweating, shivering, vasomotor tone), link with the circadian rhythm of body temperature
4. Behavioral temperature regulation (thermal comfort, temperature perception), neural models of temperature regulation, non-thermal factors (gender, age, etc.), acclimation
5. Cold environments: consequences for thermoregulation and other risks associated
6. Hot environments: from a decrease in exercise capacity to exertional heat stroke, risk mitigation and acclimation)

> 12h of lectures

> Written Exam : written exam at the end of the teaching term (30 min)

Module U1-EC3 - Gravity and Accelerations

Coordinator : Pierre DENISE

Module Aims:

1. To provide students with understanding of the physiological and medical effects of altered gravity (microgravity, hypergravity) and inertial accelerations.
2. To familiarise students with the challenges of supporting a human being exposed to altered gravity and inertial accelerations.
3. To introduce to students the countermeasures to prevent physiological and medical effects of altered gravity and inertial accelerations.

General description:

This module covers the physiological and medical effects of altered gravity and inertial accelerations as they may be encountered in aeronautics, parabolic or space flight or in experimental situations designed to reproduce some of the effects of these situations (head down bed rest, dry immersion, LBNP, centrifuge).

The course is multidisciplinary, as gravity and inertial accelerations are direct (and permanent for gravity on Earth) constraints on body fluids, muscles, bones and the vestibular system. They also induce indirect effects through fluid shifts and vestibular involvement.

The course describes the direct and indirect, as well as short term and long term, effects of gravity and inertial accelerations on all the major physiological systems.

Syllabus:

Lectures

1. Physics of gravity and inertial accelerations
2. Operational and experimental situations of altered gravity (including weightlessness) and inertial accelerations; analog models
3. Effects of gravitational and inertial accelerations on Vestibular system/Perception and space orientation
4. Sensory-motor systems and Musculo-skeletal system
5. Cardiovascular system
6. Circadian rhythms
7. Nutrition, endocrinology, body mass
8. Motion sickness

Practical work

- Methods for vestibular stimulation and vestibular reflexes evaluation
- Methods for evaluating space orientation
- Methods for evaluating motion sickness

> 12h of lectures

> 6h of Practical Work

> Written Exam : written exam at the end of the teaching term (1 hour)

Module U1-EC4 - Isolation & Confinement : Neuropsychological, Chronobiological and Functional Outcomes

Coordinator : Antoine LANGEARD

Module Aims:

1. To provide students with understanding of the neuropsychological and functional changes that are associated with social isolation and confined conditions.
2. To provide students with understanding of the chronobiological changes that are associated with social isolation and confined conditions.
3. To introduce to student possible countermeasure to the negative impacts of isolation and confinement.

General description:

The module on the effects of social isolation and confinement will cover several health issues related with the lack or the modification of social or environmental stimulations. A multidisciplinary team will explain the psychological, cognitive, functional and chronobiological impacts of environments reducing or modifying the individuals' exposure to social interactions, light and other time givers.

Syllabus:

Lectures

1. Social Isolation, Stress and Anxiety
2. Functional/cognitive impact of Stress and Anxiety
3. Global confinements effect on health
4. Closequarter/Spaceflight, sleep and circadian rhythms
5. Disrupted sleep and circadian rhythms on Human capacities
6. Countermeasure

> 12h of lectures

> Written Exam : written exam at the end of the teaching term (2h)

Module U1-EC5 - Hypoactivity/Sedentary behaviour Unloading of Weight Bearing Limbs

Coordinator : Gaëlle QUARCK

Module Aims:

1. To provide students with understanding of the physiological, psychological, and medical, changes associated with inactivity/sedentarily.
2. To acquaint the students with the current guidelines associated with physical activity.
3. To introduce to students the countermeasures to prevent and rehabilitate the physical inactivity/sedentary associated declines on earth and in space.

General description:

The module on hypoactivity/sedentary behaviour will cover several physical/ psychological/ health aspects issues due to physical deconditioning on earth and in space.

The 5h workshop will allow the students to study scientific literature in small groups and then they will have to produce a written presentation (slides) and an oral presentation.

Syllabus:

Lectures

- 1. Concepts of inactivity / sedentarity, International guidelines (WHO, HEPA, ASCM)**
- 2. Physiological / Psychological consequences (Morbidity, Pathologies, functional declines...)**

Part 1 : Physiological consequences (Morbidity, Pathologies, functional decline)

Part 2 : Psychological consequences

- 3. Consequences for space flights and models (muscle mass, bone density...)**

Part 1 : Physiological consequences for space flights and models (muscle mass, bone density etc.)

Part 2 : Psychological consequences for space flights and models

- 4. Countermeasures before, during and after flights (physical activity...)**

Workshops

The 5h workshop will allow the students to study scientific literature in small groups and then they will have to produce a written presentation (slides) and an oral presentation.

> 10h of lectures

> 5h of Practical workshops

> Oral presentation + report

Module U1-EC6 - Effects of Spaceflight on Humans

Coordinator : Gilles CLEMENT

Module Aims:

1. To provide students with understanding of the physiological, psychological, and medical, changes that are unique to space flight and planetary exploration.
2. To acquaint the students with the challenges of supporting a crew and prevent physiological deconditioning during short- and long-duration space missions.
3. To introduce to students the relevant methods (e.g., research proposal, experimental design, project management) required to perform a physiology experiment during a space mission.

General description:

This module covers a broad range of topics relevant to the extreme environment issues. The course is multidisciplinary, addressing the physiological, psychological, and medical changes that are unique to space flight and planetary exploration as well as the challenges these changes present to human mission success. The module is targeted for an audience that ranges from the aerospace enthusiast to the professional. While the lectures and workshops focus on space flight, many of the physiological and medical issues discussed are also manifested in test pilots, flight test engineers, and individuals in extreme or remote environments.

Lectures will review the history of human space flight and will examine past, present, and future studies on the effects of reduced gravity, absence of 24-hour light-dark cycle, and space radiation environment on the cardiovascular, musculoskeletal, and central nervous systems. Lecturers will also review the techniques used for measuring human responses to a changing environment and the countermeasures to prevent the negative effects of such exposure, the methods used for the life support systems, the questions asked by space physiology and space psychology research, and the physiological and engineering challenges for the exploration missions such as the generation of artificial gravity.

The students in this module will be acquainted with the challenges of supporting a crew during short- and long-duration space missions such as: (a) the countermeasures to prevent deconditioning of the organ systems mentioned above, including artificial gravity; (b) the constraints of space operational medicine; (c) the issues for psychological adaptation to confinement and isolation; (d) the requirements for extra-vehicular activities and life support systems; and (e) the conduction of scientific experiments in weightlessness.

Module U1-EC6 - Effects of Spaceflight on Humans

Syllabus:

Lectures

1. Course Introduction
2. The Spaceflight Environment
3. Human Space Exploration
4. Getting to Space
5. Life Support Systems
6. Muskulo-Skeletal System
7. Sensorimotor System
8. Cardio-Vascular System
9. Space Medicine
10. Psychological issues
11. Expeditionary Behaviour
12. Space Radiation
13. Living & Working in Space

Workshops

1. Artificial Gravity
2. Spatial Disorientation Workshop
3. Remote medicine Workshop
4. Q&A

- > 11h30 of lectures
- > 5h00 of workshops
- > Written exam at the end of the teaching term (1h)



U2

**Study Models &
Ethics**

Module U2-EC1- Study & Experimental Models

Coordinator : Gaëlle QUARCK

Module Aims:

General aim:

Building an experiment to study the effects of living in Space and understanding the effects of space environment on the Human and Animal Physiology and Physiopathology. Animal models will be study in order to be transposed to Human experimentation.

In Animals:

weightlessness (spaceflights, parabolic flights), simulated microgravity (suspended rats), relative microgravity (centrifugation, charge bearing).

In Humans:

Study of Ground-based models of microgravity (Dry immersion, Head down tilt bedrest), Gravitational stress models (parabolic flights, centrifugation, LBNP, Tilt test).

General description:

This module covers the experimental aspects of biomedical research particularly in the field of space physiology and is intended to prepare the students to set up, organize and control the experiments necessary for the understanding of the adaptation to gravity. The practical aspects of the different models used to simulate weightlessness will be studied with teachers familiar with the use of these models. A particular attention will be paid to the conditions for carrying out these experiments so that the students can recognize the advantages, the risks and the pitfalls of each model and each measurement

Syllabus:

Lectures

1. Dry immersion vs Head-Down Bed Rest
2. Tilt-test/LBNP/Orthostatism
3. Animal Models

+additional lectures during the Special Spatial Week at Novespace

Practical Work: Demonstration

> 6h of lectures in Caen + 4 lectures scheduled at Novespace

> 4h of practical workshops

> 4 days study visit : 2 days in Toulouse (MEDES/CADMOS) + 2 days in Mérignac (NOVSPACE)

> Practical evaluation during the teaching term

> Written exam at the end of the teaching term (1h)



*Special Spatial Week 2025 -
Novespace Intake 2025/2027*

Module U2-EC2- Ethics

Coordinator : Marion HAY

Module Aims:

1. To provide students with understanding of ethical aspects of research in Human and Animal as well as ethical aspects of medical and animal care with a special attention to those involved in spaceflight and isolation.
2. To acquaint the students with the challenges of supporting human decision in these environmental conditions.
3. To introduce students to the methods and explanations adapted to the concerned public in order to obtain an informed consent (Human).

General description:

This module covers ethic aspects of research in Human and Animal, and ethics in decision adapted to extreme and/or isolated environment. Beyond definitions and historical aspects, actual aspects of ethics will be approached from an operational angle with focuses on practical situations where decisions need to be taken including medical and research decisions. Examples of the rules followed in different countries will be exposed and common perspectives will be emphasized.

Syllabus:

Lectures

1. Ethics, deontology and morals
2. General principles of medical ethics
3. Ethics in Animal research: Historical aspects and general principles
4. Ethics in Human research: Historical aspects and general principles
5. Different countries, different regulations

Practical sessions

1. Practical session: How to write a request for authorization in animal experimentation?
2. Practical session: How to write the ethic file and informed consent file for Human experimentation?
3. Restitution session: Human
4. Restitution session : Animal

> 13h of lectures

> 8h of Practical workshops

> Oral presentation during the teaching term

> Written exam at the end of the teaching term (1h)

U3

**Data Acquisition
and Treatment,
from Signals to
Statistics**

Module U3-EC1- Data Acquisition and Treatment, from Signals to Statistics

Coordinator : Olivier ETARD

Module Aims:

1. To provide students with relevant methods required to perform a physiology experiment in extreme environments.
2. To explain the technical specificity of different acquisition devices.
3. To provide students with methods of signal representation and characterization in time and frequency domains.
4. To introduce students to basic statistical methods and results representation.

General description:

Theoretical and practical aspects of signal acquisition, processing and analysis will be covered in this course. The aim of this module is to allow students to be able to design experimental research protocols through appropriate methodological choices, ranging from signal acquisition devices, to the statistical data analysis and representation.

The course will be organized according to an original pattern mixing a theoretical background provided during lecture with workshop. Lectures will start 2 weeks before workshops in order to allow students to apply their theoretical knowledge in practice during workshops. During workshops, each student will conduct their own scientific project and design an experiment in order to answer a physiological question in relation with an extreme environment. They will learn to choose an appropriate experimental design, the data acquisition devices and treatment, the statistical procedures, and finally report their results. Workshops will be organized around small groups of students (3-4). We will give them a list of all the techniques and devices available, and they will be asked to answer the research question through proper experimental design, data acquisition and treatment, and statistical analysis. While theoretical knowledge will be evaluated with a quiz, the students' research project will be evaluated with a final presentation of their results during a lab's seminar.

Syllabus:

Lectures

DATA ACQUISITION

1. Digital Acquisition
2. From sensor to hard drive
3. From temporal to frequency representation
4. Noise and Filter
5. How to do medical imaging: Parts 1, 2 & 3
6. How to do ExG : Parts 1 & 2
7. How to do NIRS
8. How to process time series (variability, averaging...)
9. How to process images

Module U3-EC1- Data Acquisition and Treatment, from Signals to Statistics

STATISTICS

10. Introduction to statistics (variable, sample, population, software....)
11. Statistical hypothesis testing (Null and alternative hypotheses, parametric/nonparametric, normality...)
12. Group comparisons (Student T-tests)
13. Group comparisons (ANOVA 1 2 et RM)
14. Questionnaires / Categorical statistics
15. Linear Model (Correlations, Linear regressions...)
16. Statistical analysis of time series Modeling (fitting, cosinor analysis...) mixed model
17. Data representation

Workshops

- WS1 PART 1: Overview
- WS1 PART 2 Introduction to literature review and bibliographic tools
- WS1 PART 3 : MatLab Presentation
- WS2 Biopac ECG acquisition
- WS3 Ultrasound Measurement of cardiac input
- WS4 Presentation of the hardware available in the lab
- WS5 Experimental Design
- WS6 Presentation of the medical imaging equipment + MRI test
- WS7 EXAMINATION BOARD: Presentation of the research topic
(Literature review and presentation of the question)
- WS8 Implementation of the experimental design (choice of materials and methods, configuration and setup)
- WS9 Implementation of the experimental design (pretests)
- WS10 Data acquisition - PART 1
- WS11 Data acquisition - PART 2
- WS12 Data analysis and representation - PART 1
- WS13 Data analysis and representation - PART 2

- > 40h of lectures
- > 40h of workshops
- > WS Examination : Studies presentation seminar (poster presentation + 2 oral sessions) Written exam at the end of the teaching term (1h)

2.4 Exams and Grades

Exams and assignments dates are defined by the program coordinator.
The overall grade in each unit is determined by your grades in that unit's modules. You will receive a number grade for each module, and then the average grade over the modules within a unit will make up your result for that unit.

You need at least 10 to validate each Teaching Unit. Only modules within the same Teaching Unit can be offset.

Grade Conversion Table

Caen Mark	Caen Grade	SpaceMed Erasmus Mundus Grade	SpaceMed Erasmus Mundus Grade Description
<10	Adjourned/Failed	F	Failed
10	with standard pass	E	Pass
]10-12[		D	Sufficient
]12-14[	with honours	C	Satisfactory
]14-16[	with high honours	B	Good
]16-18[	with highest honours	A	Very Good
]18-20]	with highest honours and distinction	A+	Excellent

Attendance

For all courses, attendance is mandatory.

The program confirms your attendance through regular checks of your physical attendance.

In the event of absence, you must notify the teacher concerned and the administrative coordinator by e-mail.

2.5 IT Services

The University of Caen Normandie provides a wide range of digital services and resources to its community, in order to make studying, working, doing research and living at university easier.

You can access this offer via a specific digital account that you will have access to once your registration has been validated on-site at the registration desk of the University of Caen.

This account is called the Etupass compte numérique ("Etupass" digital account). It remains valid for the whole duration of your studies at university. It enables you to :

- use the free WiFi network provided by the university. Many WiFi hotspots are installed on the various campuses allowing you to connect to the Internet from your personal equipment.
- benefit from the UNICAEN secure cloud to have access to all your files via the Internet.
- access online courses and exercises
- consult your university schedule updated every day
- borrow books from the library and visit the documentary portal
- access self-service computer rooms. Workstations allow you to connect to the Internet and use different software packs (OpenOffice, PDF reader, image editing software, etc.). Multifunction copiers are also available in these rooms.

2.6 Student card - Léocarte (Leocard)

The Léocarte is an ID system for students.

What is it for?

- Eat in the University restaurants or cafeterias
- pay at the drinks/coffee/snacks machines on the university premises
- Borrow books from the libraries
- Proof that you are a UNICAEN student (it can entitle you to discounts in some shops, restaurants and for transport)
- Access to printing services at the University



Your student card (Léocarte) will be handed to you during the first day of the Induction Week upon arrival.

2.7 Introduction to Zimbra and eCampus

ZIMBRA

You can access your student mail box and your timetable through ZIMBRA:
<https://webmail.unicaen.fr/>

eCAMPUS

Most of the course materials will be made available to you by the teachers as the semester progresses.

<https://ecampus.unicaen.fr/>

The screenshot shows the eCampus website interface. At the top, there is a navigation bar with links to ZIMBRA UNICAEN, HOTMAIL, SpaceMed, Plateforme eMundus, PORTAL EC EUROPA, Erasmus Networks P..., UniCloud, ADAEL, GeDemande, and Events. Below this is a red circular logo with a white 'e'. The main header contains the text "Dashboard My courses Tous les cours Outils Assistance". The main content area displays the course title "(BIOSM1203) Master 1 Biologie-Santé (BS) P. SpaceMed" in bold. Below the title, there is a "Category" dropdown menu set to "More". A section titled "Choisir un élément" contains a dropdown menu showing "UFR Santé / M1 / (BIOSM1203) Master 1 Biologie-Santé (BS) P. SpaceMed". Below this is a "Search courses" input field with a magnifying glass icon. The main content area also shows "Etape - (BIOSM1203) Master 1 Biologie-Santé (BS) P. SpaceMed" and a "Collapse all" link. A list of course elements is displayed, starting with "S1" and "U1 Extreme environments & basics in physiology". The list includes several sub-items with icons and information icons:

- U0 Induction Week
- U1 Space Flight
- U1 Stress, isolation, confinement; Circadian rhythms
- U1 Hypoxia, hypo/hypercapnia, hypo/hyperbaric conditions
- U1 Thermoregulation, hypothermia, hyperthermia



03

Additional Resources

3.1 Getting started in Caen

Meals and Student restaurants

Campus 1

- Restaurant A
- Cafeterias: «La Parenthèse» (under *galerie vitrée*) ; «L'apostrophe» (Building B); «Le Calypso» (SSE Building, L'Oxygène)

Cité Lébisey

- Restaurant C
- Bar-fast food «Le Mambo», open 7 days a week year-round

Campus 2

- Restaurant D
- Bar-cafeteria : «Highlands Bar» ; «la cafétéria des Sciences 1»

Campus 4/5 (the closest from PFRS)

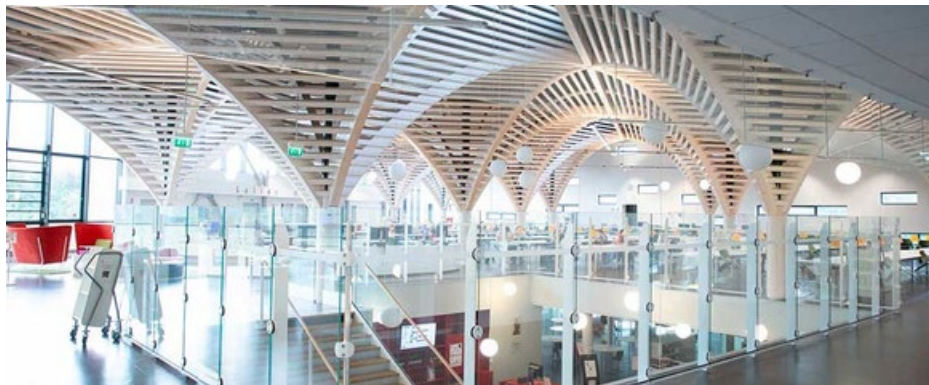
- Restaurant Claude Bloch (lunches only, from Monday to Saturday) : <https://www.crous-normandie.fr/restaurant/ru-claude-bloch/>
- PFRS Cafeteria : <https://www.crous-normandie.fr/restaurant/cafeteriapfrs/>

University restaurants serve lunch and diner. Breakfast can be taken in the different cafeterias. Meal: €1 which can be paid by credit card or with your Izly (payment with your Leocarte or with the Izly smartphone App). <https://www.izly.fr/>

Information on Crous Caen Normandie restaurants and cafeterias: <https://www.crousnormandie.fr/restauration/nos-structures-derestauration/carte-des-restaurants/>

Information on Izly: <https://www.crous-normandie.fr/se-restaurer/payer-son-repas/>

University Libraries



UNICAEN has a network of 7 university libraries and 11 specialised faculty libraries (teaching units, schools, and institutes). They are spread between the campuses of Caen, Alençon and Cherbourg and they provide a friendly and supportive learning environment.

<https://welcome.unicaen.fr/campus-life/libraries/>

Two of the libraries remain open on evenings: the Bibliothèque M. Brès (Health Department), located on campus 5, and the Bibliothèque P. Sineux (LawLiterature Departments), located on campus 1. You can access these libraries from Monday to Friday, from 7PM to 11PM, upon presentation of the student card (called Leocarte). On Saturdays, from 9AM to 7PM, you can access the Bibliothèque R. Franklin (Sciences-Sports Departments) located campus 2 and on Sundays, from 1PM to 7PM, you can access the Bibliothèque M. Brès, located on campus 5.



Find your library : Check out the Libraries website to find the locations and schedules.

<https://bibliotheque.unicaen.fr/venir-a-la-bu/bibliotheques/>

Health

In case of illness, the «Service de santé étudiant - SSE» (student medical centre) provides general practitioner appointment and medical prescriptions.

In case of an emergency, just dial 15 on any phone (toll-free number) to be in touch with the emergency services.

There are several hospitals in Caen with an Emergency unit where you can go if necessary, especially at night or on weekends. Otherwise, always consult with a general practitioner first.

In case of hospitalization, make sure that you have your insurance documents with you so you don't have to advance the payment when leaving the hospital (always very expensive).

Information about SSE at :

<https://www.unicaen.fr/vie-de-campus/sante-bien-etre-handicap/>



Emergency numbers

- POLICE SECOURS : 17
- FIRE DEPARTMENT : 18
- SAMU (Emergency Medical Assistance) : 15
- SOS MEDECINS : 3624
- PHARMACISTS ON DUTY: 3237 (numéro audiotel 24h/24h, 0,34€ TTC / MIN)
- DENTAL EMERGENCIES : 02 31 85 18 13 (Sundays and national holidays)
- CHU (University hospital) : 02 31 06 31 06

Also, if you simply pick-up any green phones marked « urgences médicales » in the hallways of University buildings, you will be on line with the emergency services (SAMU).

Internet

Internet access is available on all campuses (wifi through the Eduroam network) and in University residences (wifi or wired internet; make sure to bring a RJ45 cable). UNICAEN and CROUS residences also have computer rooms that you can access with your student card.

REMINDER: the French electrical standard is 230 volts. Make sure that your electronic devices are compatible with that standard.

Internet access on campus is secured by your personal digital account provided upon registration.

Guarantor

To rent an accommodation in France, you will need to provide a payment guarantee. For landlords this type of deposit is the only way to guarantee that the monthly rents will be paid, if the occupants stop paying them.

- GARANTME : <https://garantme.fr/en>
- VISALE : <https://www.visale.fr/>

Housing insurance

No matter which type of accommodation you will choose, you will have to subscribe to two mandatory insurance policies:

- Home insurance
- Personal liability

Housing insurance covers damages made to your habitation and goods, in case for instance of a fire, water damages or robbery.

Personal liability covers physical and/or psychological injuries you may cause to a third party if you are held responsible, for instance, for a fire or water damage in your place of residence.

A proof of home insurance with personal liability will be required when signing your rental agreement. Failure to present these documents will result in termination of your tenancy agreement, even for CROUS housing. Most insurance companies provide home insurance with personal liability coverage for approximately €60 per year.

Even if you are sharing a house, subletting, or staying for free, you must have home insurance. In these cases, the easiest and most economical way is to ask to be added to the home insurance policy of the person you live with.

Getting to Caen

Once in Paris, you will have to go to Saint-Lazare train station:

- by cab: app. €60 from the airports, and between €15 and €20 from a train station
- to another;
- by bus, RER or subway: €13 from the airports and €2 from a train station to another.
- Subway map available at www.ratp.fr

Once at Saint-Lazare, you can board a train to Caen. The ride is 1.45 to 2.15 hrs depending on the train. For information, all trains to Cherbourg stop in Caen. Schedules and rates at www.sncf-connect.com



Sports at the University

The «*Service universitaire des activités physiques et sportives*» (SUAPS) offers a whole set of sport facilities, including a swimming pool, located on campus 1 (next to restaurant A).

SUAPS - Tel : 02 31 56 64 61

<https://www.unicaen.fr/vie-de-campus/viesportive/activites/caen/>

Online registration will start in September 2026. It costs around €30/year.

Registration : <https://gest.unicaen.fr/suaps/inscription/suaps0.php>

Planning Caen activities : <https://gest.unicaen.fr/suaps/inscription/planning.php>



Public Transport System

Caen metropolitan area: **TWISTO** (trams, bus, bikes)

Subscriptions (unlimited travels): **27€/month** (under 26 y-o) / **44€/month** (from 27 years old)

1 hour ticket: **1,60€** (+0,20€ refillable ticket) / ticket book available

Where to buy a ticket/subscription: TWISTO shop, internet, tram station or by SMS on 93500

<https://www.twisto.fr/en>



Caen by bike

Cycling is an excellent way to discover Caen and its surroundings. Numerous bicycle paths wind through the city to make your urban travel safer and the walking and cycling paths allow you to pedal in peace to the sea or to the countryside, far from the traffic noises and exhaust fumes. If you want to buy, rent or repair a second-hand bike, or discover the cycle paths, visit the Maison du vélo.

The company Twisto also offers various bike rental packages.



A velib station is located on campus 5! <https://www.twisto.fr/en/node/618>

Cultural Life

<https://welcome.unicaen.fr/campuslife/cultural-life/>



Erasmus Student Network (ESN) Caen and Buddy System

ESN Caen welcomes you!

In collaboration with the university and its local partners, the ESN student association organizes a wide range of activities to help settle into life in Caen. ESN Caen ensures that international students are well-integrated into their study environment, with mentoring and mutual support systems, as well as into local areas, with visits to the city, the campus and historical sites in Normandy, bonding evenings, buddy evenings, horse-riding outings, visits to museums and more. They also organize Polyglot Cafés several times a month, where local and international students get together to chat in a spirit of conviviality and good humor (in French, Spanish, Italian, Arabic, Portuguese, Chinese, Russian, German, Norwegian, Swedish, Danish...)

You would like to have someone help you with your paperwork (documents, accommodation, jobs), guide you through the local culture and practice the language and help you meet local students?

Make sure to join the ESN Caen Buddy System at <https://buddysystem.eu/fr/register>



Learn more about

- UNICAEN: www.unicaen.fr
- Student life: www.unicaen.fr/bienvenue
- Caen City: www.caen.fr
- Local weather: <https://meteofrance.com/previsions-meteofrance/normandie/2>
- Normandy: www.normandie-tourisme.fr
- Train schedules: www.sncf-connect.com
- Paris subway: www.ratp.fr
- Paris airports: www.parisaeroport.fr/
- Carpooling in France: www.blablacar.fr
- National bus lines: www.blablacar.fr/bus and www.flixbus.fr
- Caen buses and tramways: www.twisto.fr
- Regional buses: www.nomadcar14.fr/fr/
- Caen-Carpiquet airport shuttles: www.bhs-shuttle.fr & www.albion-voyages.com
- Caen-Carpiquet airport: www.caen.aeroport.fr

3.2 FAQ

Where can I find my enrollment documents?

Documents relating to enrolment for the 2026–2027 academic year can be found on MonDossierWeb, e.g. downloading my enrolment certificate.

<https://mascolarite.unicaen.fr/>

What happens if I have problems with my card or if lose my Leocard?

You must deactivate your card by logging on to <https://sgc.unicaen.fr> and request a renewal.

If you find it again, all you have to do is reactivate it.

How can I access my marks or my exams results?

<https://mondossierweb.unicaen.fr>

Once you have logged into Mon dossier Web, click on the 'Grades and results' tab ("Notes et résultats").

You will find the results for each semester of your entire university course.

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10	with standard pass	E	Pass
]10-12[		D	Sufficient
[12-14[	with honours	C	Satisfactory
[14-16[	with high honours	B	Good
[16-18[	with highest honours	A	Very Good
[18-20]	with highest honours and distinction	A+	Excellent

What happens if I fail an exam?

If you fail an exam, you will need to do a second exam at a later date. If you pass the second exam, your grade for the module will be replaced with the new grade and the failed grade will not appear in your degree.



Co-funded by
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Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.