



# Master's Degree in Cell Imaging

University of Rouen Normandie

Dr Delphine Burel, PhD, HDR  
*Assistant professor*



January 22, 2021




Normandie Université

**Rouen: 140 km from Paris**



**Students**  
  
**30 000**

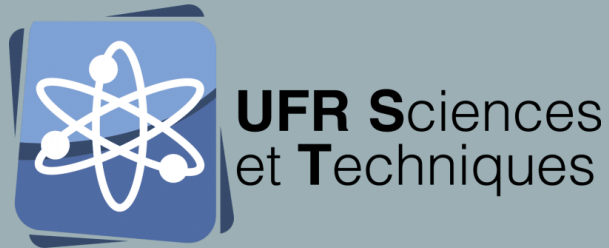
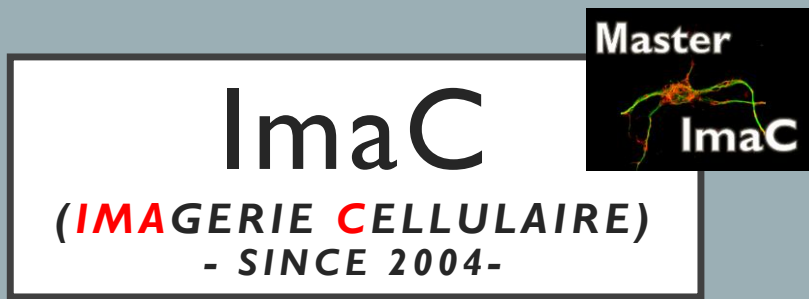
**Lecturers-  
Researchers**  
  
**2 500**

**Labs**  
  
**38**



  
**300**

- Humanities and Social Sciences
- Sciences of Man and Society
- Law, Economics and Management
- Health
- **Sciences and Techniques**
- Sciences and Techniques of Physical and Sports Activities (STAPS)



**Dr Delphine Burel, PhD, HDR**  
***Assistant Professor, Univ Rouen***

**Dr Oana Chever, PhD**  
***Assistant Professor, Univ Rouen***

**Dr Ludovic Galas, PhD, HDR**  
***Research Engineer, Inserm***  
***PRIMACEN Director***

## Assistant Professors (Univ. Rouen)

- Department of Biology
- Department of Physics
- Department of Mathematics
- Department of Languages

## Researchers



## Engineers



***Cell Imaging Platform of Normandy***

## A 20-year-old core-facility

- **Director : Dr Ludovic Galas**
- **Staff:** 14 people including Engineers, Researchers and Assistant Professors
- Core-facility area: **1100 m<sup>2</sup> in a brand new building**
- **Belongs to the GIS IBISA** : Infrastructure en Biologie, Santé et Agronomie  
([www.ibisa.net](http://www.ibisa.net))
- More than **60 equipment** (5 M€) for Cell Imaging but not only...

IBISA

[www.primacen.fr](http://www.primacen.fr)



CURIB Marianne Grunberg-Manago

ANALYSIS

## & PROCESSING

- Image J
- Imaris
- Huygens
- Softwares

SAMPL

## PREPARATION

- Cell culture (BSL-2)
- Fixed and living Tissues
- Embedding and Sectioning...
- High-Pressure Freezing
- Freeze-substitution...
- Laser capture microdissection

PROBE

## LABELLING

- cell permeant
- uptake
- virus infection
- click chemistry
- ...

INSTRUMENT

## IN 7 DIMENSIONS

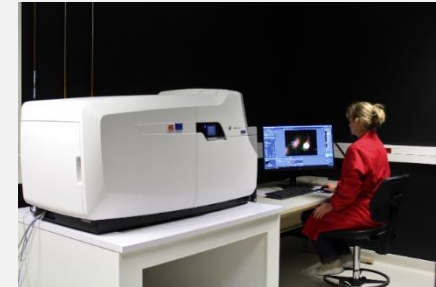
$x, y, z, t, \lambda, \Delta, \tau$

- Transmitted Electron Microscopy
- Light microscopy/macroscopy (BF, DF, PC, DIC)
- Plate-readers
- Wide-field microscopy
- TIRF microscopy
- Confocal microscopy/macroscopy
- Two-photon microscopy
- STED nanoscopy (2D/3D)
- FLIM/Tau-STED



For researchers but also  
for **Master students**

- Dr Ludovic Galas (Research Engineer Inserm), Biologist,
- Dr Magalie Bénard (Research Engineer Inserm), Biologist,
- Damien Schapman (Engineer URN), Physicist, Quality Assessment,
- Alexis Lebon (Engineer Inserm), Computer Scientist,
- Dr Delphine Burel (Assistant Professor URN), Biologist,



## Main imaging systems:

- Axioscope 7
- THUNDER
- Large Scale Imaging
- TIRFM
- Cell Discoverer-7
- SP8 MP
- SP5 X STED
- STELLARIS tau-STED 3D



Damien Schapman



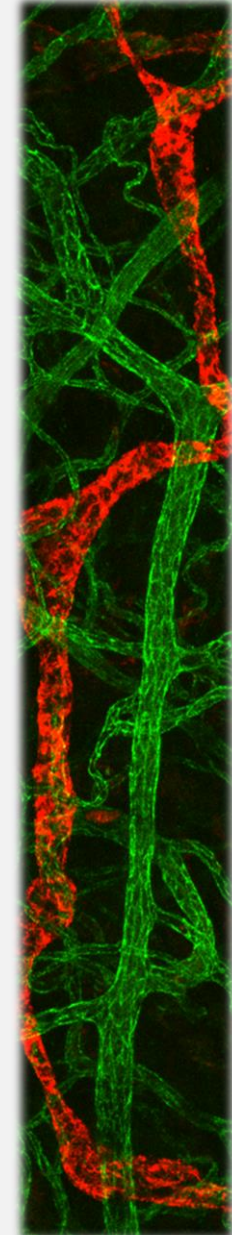
New international network 2020

<https://quarep.org/>

Dr Roland Nitschke



« Quality Assessment »  
teaching Module





Duration of the course: 2 years

Number of participants /year: 12

YEAR 1 = 60 ECTS

one year full time : 460 class hrs  
+ internship

1<sup>st</sup> semester (290 hrs)  
September-December  
+ *examinations in January*

2<sup>nd</sup> semester (170 hrs)  
January-April  
+ *a 2-month internship*  
+ *oral defense in June*

YEAR 2 = 60 ECTS

one year full time : 332 class hrs  
+ internship

3<sup>rd</sup> semester (300 hrs)  
September-December  
+ *examinations in January*

4<sup>th</sup> semester (32 hrs)  
**(only Quality assessment)**  
*January + a 6-month internship*  
+ *oral defense in September*

## KNOWLEDGE ENHANCEMENT IN CELL BIOLOGY *(IN FRENCH)*

35 hrs

Biomembranes  
and signalling

40 hrs

Structural biology

20 hrs

Statistical modeling  
for biology

40 hrs

Cell cultures and  
analysis

## FIRST APPROACHES IN CELL IMAGING *(IN ENGLISH)*

40 hrs

Upgrading in  
• Mathematics  
• Physics

40 hrs

Imaging Solutions  
Image Processing

40 hrs

Instrumentation in  
medical imaging :  
Theoretical aspects

60 hrs

Photon Imaging

30 hrs

Sample preparation

## ADDITIONAL SKILLS

34 hrs

Business knowledge  
• Career prospects  
• Platform Management

40 hrs

English  
• Certification  
• Working comm.

20 hrs  
Quality standard

**+ a 2-month lab internship**  
**Report and Oral defense (June)**

1<sup>st</sup> semester (300 hrs) September-December

2<sup>nd</sup> semester (160 hrs) January-June



## Imaging techniques

- Wide-field microscopy/macroscopy (BF, DF, PC, DIC, fluo)
- TIRF microscopy
- Confocal microscopy/macroscopy
- Videomicroscopy
- Lightsheet microscopy

## Sample preparation

- Cell culture
- Vibratome, Cryocut
- Immuno-histo/cyto-chemistry
- Laser capture microdissection

## Image processing

- ImageJ
- Imaris

**#70 h of practical work  
on PRIMACEN devices**

## PHYSICAL PRINCIPLES OF IMAGING DEVICES *(IN ENGLISH)*

32 hrs

Laser optics  
Detectors

32 hrs

Metrology /Quality  
assessment

## ADVANCED TECHNIQUES IN CELL IMAGING

*(IN ENGLISH)*

110 hrs

High techn. Imaging

- Advanced photon microscopy
- Bioscreen
- Electron microscopy

80 hrs

Image processing softwares  
Image Computing

## ADDITIONAL SKILLS *(IN FRENCH)*

44 hrs

Business skills

- English for workplace
- Labor law

40 hrs

Sales and marketing

Project management

+

*a 6-month internship  
(lab or industry)*

**Report and Oral defense  
(September)**

## Imaging techniques

- Two-photon microscopy
- STED
- Automated Microscope (CD7)
- FLIM
- Thunder
- Transmitted/Scanning Electron Microscopy
- Screening strategy

## Image computing

- Matlab, SciLab
- Histograms, thresholding
- Filtering, Segmentation...

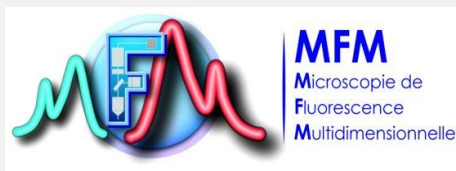
## Quality assessment

- Illumination power
- Detection system performance
- Uniformity of field
- Lateral and axial resolution
- Stage and focus

## Image processing

- Hyugens
- ImageJ
- Imaris
- Computational clearing
- Machine learning
- Data management

**#100 h of practical work  
on PRIMACEN devices**



<http://rtmfm.cnrs.fr>

Dr Sophie Allart



- Federates more than 50 cell imaging core-facilities
- Host platforms
- Mostly host research labs for internship
- Close contacts with company staff

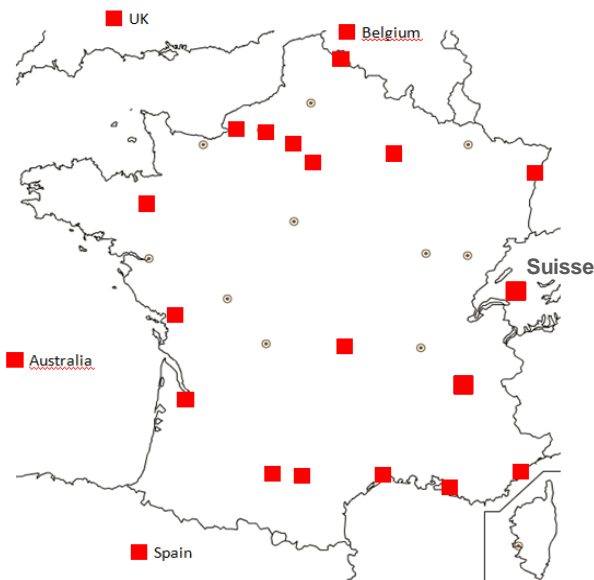
GDR CNRS



Dr Laurent Héliot



<http://imabio-cnrs.fr/mifobio/presentation-de-mifobio/>

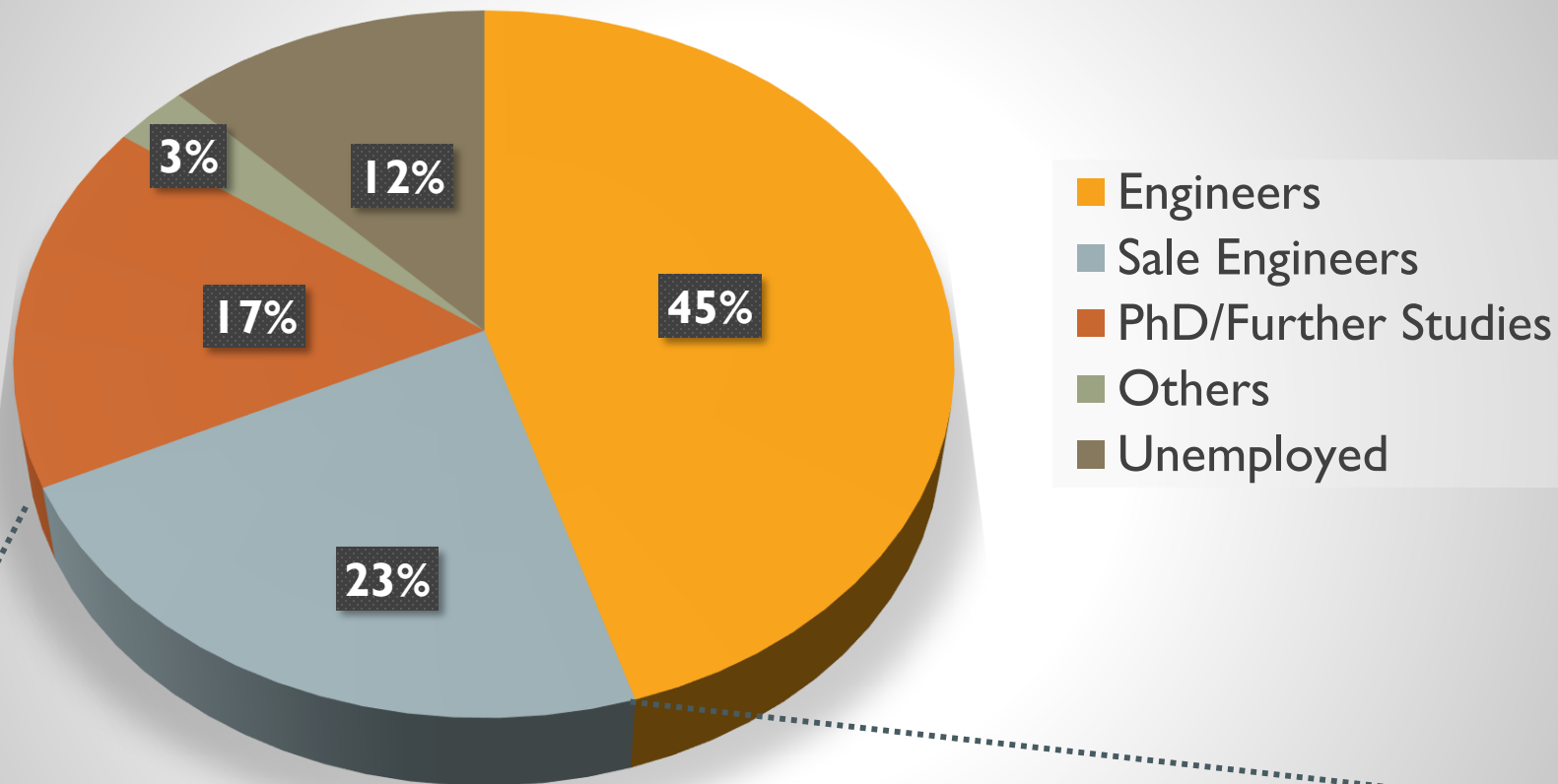


Multidisciplinary  
School for life  
imaging



**Former master students as a core-facility/lab or company staff**

***FULL EMPLOYMENT FOR 88%***



## Application between March and May

<https://www.univ-rouen.fr/university-of-rouen-normandy/apply-and-study/>

YEAR 1 = 60 ECTS

one year full time : 460 class hrs  
+ internship

### Bachelor Degree

- Biology
- Or equivalent

**+B2 level in French**



1<sup>st</sup> semester  
September-December  
(French)



### Master Degree

- Year 1 or 2
- Biology
- Or equivalent

2<sup>nd</sup> semester  
January-June  
(English)

YEAR 2 = 60 ECTS

one year full time : 332 class hrs  
+ internship



### Master Degree

- Year 1 or 2
- In Biology
- In Optics
- Or equivalent



3<sup>rd</sup> semester  
September-December  
(English)

4<sup>th</sup> semester  
(only quality assessment)  
January-June (English)

### Master Degree

- Year 2
- In Biology
- In Optics
- Or equivalent

**Master students and others...  
are welcome in**

