

Master in Chemical Biology

Visualising and controlling biological processes using chemistry



UNIVERSITÉ
DE GENÈVE



ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE



FONDS NATIONAL SUISSE
SCHWEIZERISCHER NATIONALFONDS
FONDO NAZIONALE SVIZZERO
SWISS NATIONAL SCIENCE FOUNDATION

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OBJECTIVES

- to give students the **diverse background** that they will need to fully profit from the incredible advances offered through **chemical biology**
- to provide a **hands-on approach** and a **high PI-to-student ratio**
- to perform **cutting-edge research**

CONTEXT

The Master in Chemical Biology is awarded by the **University of Geneva** in collaboration with the **EPFL**.

Master organized by an **interdisciplinary network** of labs, within a national centre of excellence in research: the **NCCR Chemical Biology**



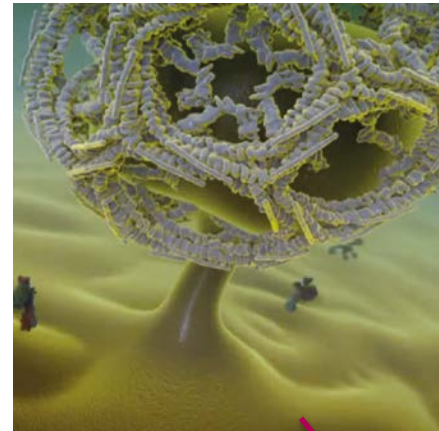
Developing chemistry-based tools to manipulate and visualise biochemical activities in living cells

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PROGRAMME

- 1 semester of courses
 - Current topics in Chemical Biology and Biochemistry
 - Basic techniques in Chemical Biology
 - Tutorial in Chemical Biology
 - Microscopy and Imaging course
 - Chemical Biology
 - Element of bioinformatics (optional)
 - Image processing (optional)
 - Chemistry of small molecules (optional)
 - Etc.
- 2 practical placements within NCCR labs
 - Programme length: typically 1.5 years (3 semesters)
 - Number of ECTS credits : 90 (+30 possible)
 - Courses at either UNIGE or EPFL
 - Courses are all taught in **English**



*Membrane traffic mechanics:
how membrane shape affects
the fission reaction*

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EXAMPLE OF RESEARCH TOPICS

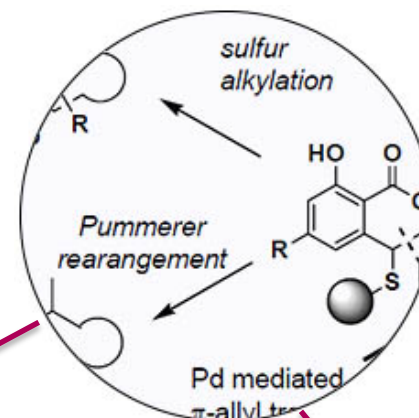
Bioorthogonal chemistry

Objectives:

- Expanding structural/functional diversity space beyond the commercially available space
- Providing the required synthetic chemistry expertise to follow up on identified hits, identify inhibitors and perform medicinal chemistry follow-ups.

Project leader: Prof. Nicolas Winssinger

Lab place: UNIGE



The lab team has developed diversity oriented solid phase and polymer assisted syntheses of radicicol, pochonins, as well as aigialomycins

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EXAMPLE OF RESEARCH TOPICS

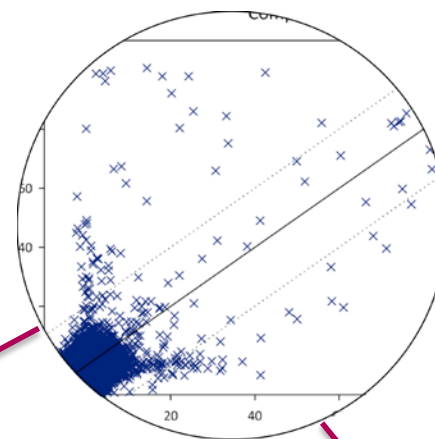
Chemical Systems Biology

Objectives:

- Screening for small molecules that target various signaling and/or biosynthetic pathways in yeast and in higher eukaryotes.
- Mass Spectrometry-based Quantitative 'omics approaches and innovative chemistry
- Development of generic approaches to identify the molecular targets of orphan compounds.

Project leader: Prof. Robbie Loewith

Lab place: UNIGE



Growth control by TOR signaling pathways

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EXAMPLE OF RESEARCH TOPICS

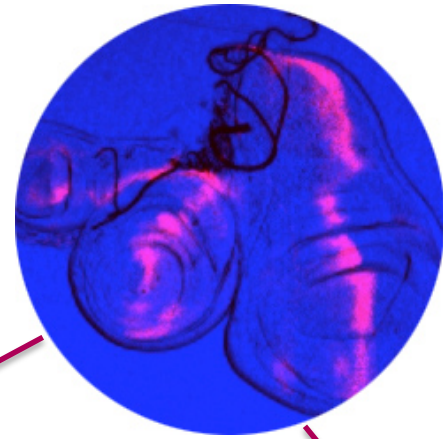
Sensors and assays to study cell mechanics and endosomal motility

Objectives:

- Study the cell as a physical object using chemical sensors and biophysical tools
- Study the role of membrane mechanics in different cell types and tissues during e.g. membrane fission, in endocytosis and cytokinesis, during cell size control in asymmetric division.

Project leader: Prof. Marcos Gonzalez-Gaitan

Lab place: UNIGE



Some researchers study the Decapentaplegic gradient in the anterior compartment of the wing disc, and relationship between gradient profile and cell cycle arrest.

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EXAMPLE OF RESEARCH TOPICS

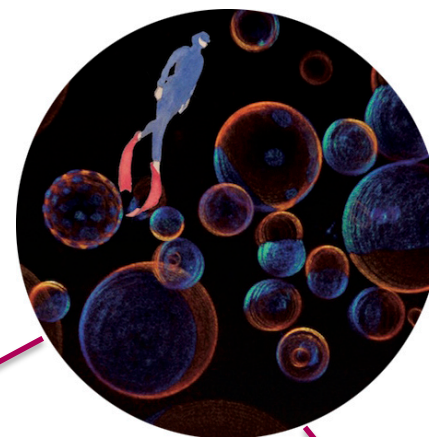
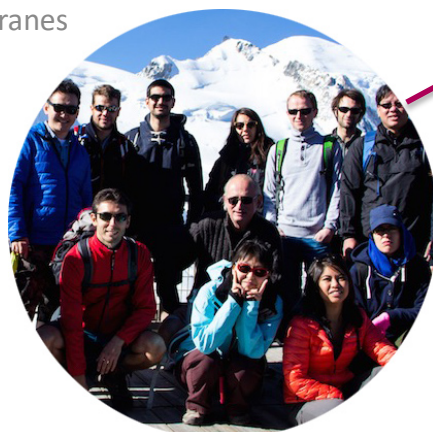
Cellular entry and novel membrane probes

Objectives:

- Conceptually innovative approaches to cross membrane barriers and enter cells, and to image biologically important properties of bio-membranes that are otherwise difficult to detect
- Conceptually innovative membrane probes, cell-penetrating poly(disulfides)
- Approaches for sensing membrane phases, microdomains and potentials.

Project leader: Prof. Stefan Matile

Lab place: UNIGE



Mechanosensitive membrane probes

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WHO CAN APPLY?

Bachelor degree holders in the sciences, especially in chemistry, biology, biochemistry, biophysics or equivalent. A good level in biology and chemistry is required.

The Master is ideally suited to young scientists wishing to orient their career towards chemical biology, whether in an academic or industrial setting.

ADMISSION FOR THE ACADEMIC YEAR 2018/2019

- Starting date: September 2018
- Deadline is **February 28** for those who need a visa
- **April 30** for others
- No deadline if you have studied at UNIGE before

Admission upon selection



Inhibition of epigenetic targets using organometallic chemistry for the treatment of malignant diseases

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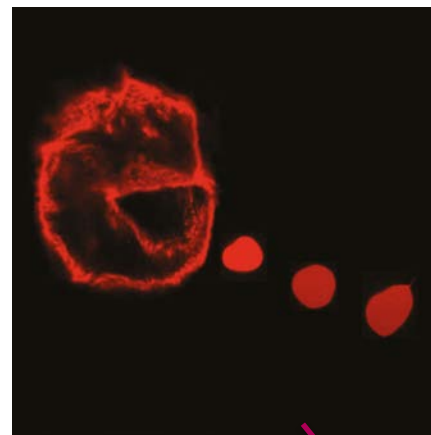
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TUITION FEES CHF 500.- per semester

EXCELLENCE FELLOWSHIP PROGRAMME

- Application is **open to students from any university with very good performance in their studies** (belonging to the best 10% of their bachelor's program).
- Selection will be based on **excellence**.
- Evaluation will be made on the basis of the documentation sent by the applicants.

>> Next application deadline is 15 March 2018
(for Masters starting in September 2018)



*Lighting up the membrane!
Organic synthesis of artificial
phospholipid probes*