Institute for Modeling in Neuroscience and Cognition

September 9th, 2020

Who are we?

We are transdisciplinary!
About **170 permanent researchers** from **various scientific fields**, **locally based:** UCA, CNRS, Inria, Inserm, CHU…
neuromod.diff@listes.univ-cotedazur.fr
Pour être ajouté:
contacter chloe.bourgeois@univ-cotedazur.fr

COGNITION

MSHS, BCL, GREDEG, LAPCOS, LHAMESS, COBTEK, LINE ~ 20

MODELING

LJAD, I3S, INRIA, LEAT, INPHINI, ICN ~ 80

HEALTH

CENTRE MÉMOIRE, NEUROSCIENCES CLINIQUES, IMAGERIE, GÉRONTOLOGIE, CHU LENVAL, FRIS ~ 20

BIOLOGY

IBV, IPMC, LP2M ~ 50

History of NeuroMod

2013

Launch of MTC-NSC, an interdisciplinary axis of UNS (+ CNRS and Inria)

Spring 2016

Call for “expression of interest” by UCA-Jedi

Fall 2016

Creation of the structuring program **C@UCA** (1 among 9): *Cognitive systems, normality and pathology of the human brain, and computational neuroscience*

C = « Cerveau, Cognition, Comportement, Collectif, Clinique, Computationnel »

2 projects in **2016** : MNC3, From Mind to Brain
1 project in **2017**: Computabrain
30 – 50 smaller projects (few thousands euros)

History of NeuroMod

2 successful conferences in 2017 and 2018 as C@UCA.
In 2018 a think tank came to expertise us and evaluated our work very positively.

NeuroMod is the first interdisciplinary institute funded by Université Côte d'Azur!

→ Official Institute status since the 1st of January 2020

→"Composante pérenne d'UCA"

** NeuroMod **

Our name was voted by the scientific committee and stands for Modeling in neuroscience and cognition

What we do in a nutshell

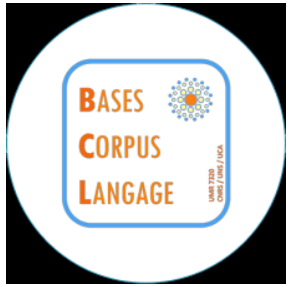
Creating strong bonds between disciplines in order to develop the research in neuroscience and cognitive science with modeling as a common language

We work hand in hand on new projects, research topics and our training program

We primarly focus on local resources, and we foster cooperations with local actors!

We fund relevant projects for our institute such as the participation/organization of conferences, investments in small material, job positions…

Scientific board = 25 researchers from different disciplines



Executive board

Director: Patricia Reynaud-Bouret
Co-director : Alexandre Muzy

Board: Patricia Reynaud-Bouret, Alexandre Muzy, Tobias Scheer, Massimo Mantegazza, Bruno Cessac

Administration : Chloé Bourgeois, Amandine Laloë-Verdelhan

Achievements of the year 2020

- Inauguration should have happened in March 2020… It would hopefully happen on November 9, 2020 at « le Galet » (Film)
- Other events: Minicourses (~ 1 per month), lecture serie “Future challenges in neuroscience and cognitive sciences” (every 3 months), PhD seminar,
- Despite lockdown, joint NeuroMod (Nice) NeuroMat (SaoPaulo) webinar
- Since mid-2019, premises: 2 offices and 1 meeting room at Inria Sophia Antipolis
- We granted 2 postdoc positions & hired 1 technical engineer for the CoColab in 2019, in 2020 we granted 3 pHd grants

Two training programs

Two Master programs are hosted by the Institute (and not by EUR)

International M.Sc. Mod4NeuCog (Modeling for neuronal and cognitive systems) http://univ-cotedazur.fr/en/idex/formations-idex/mod4neucog

Master National de Sciences Cognitives opened in September 2019

Based on experimentation, in French (courses are mostly mutualised with other Masters)

Mod4NeuCog

Dir: I. Bethus

- 2-year master's program on the modeling of neuronal and cognitive systems
- interdisciplinary
- Innovative mentoring approach: Mod4NeuCog aims to encourage students to develop their natural curiosity and independence.
- train active researchers at the crossroads of applied mathematics and cognitive sciences.

The fields of specialization include:

medicine, mathematics, linguistics, physics, experimental economics, psychology, computer science, neurophysiology or chemistry of olfaction.

The Mod4NeuCog MSc is part of the NeuroMod Institute and the UCA JEDI program.

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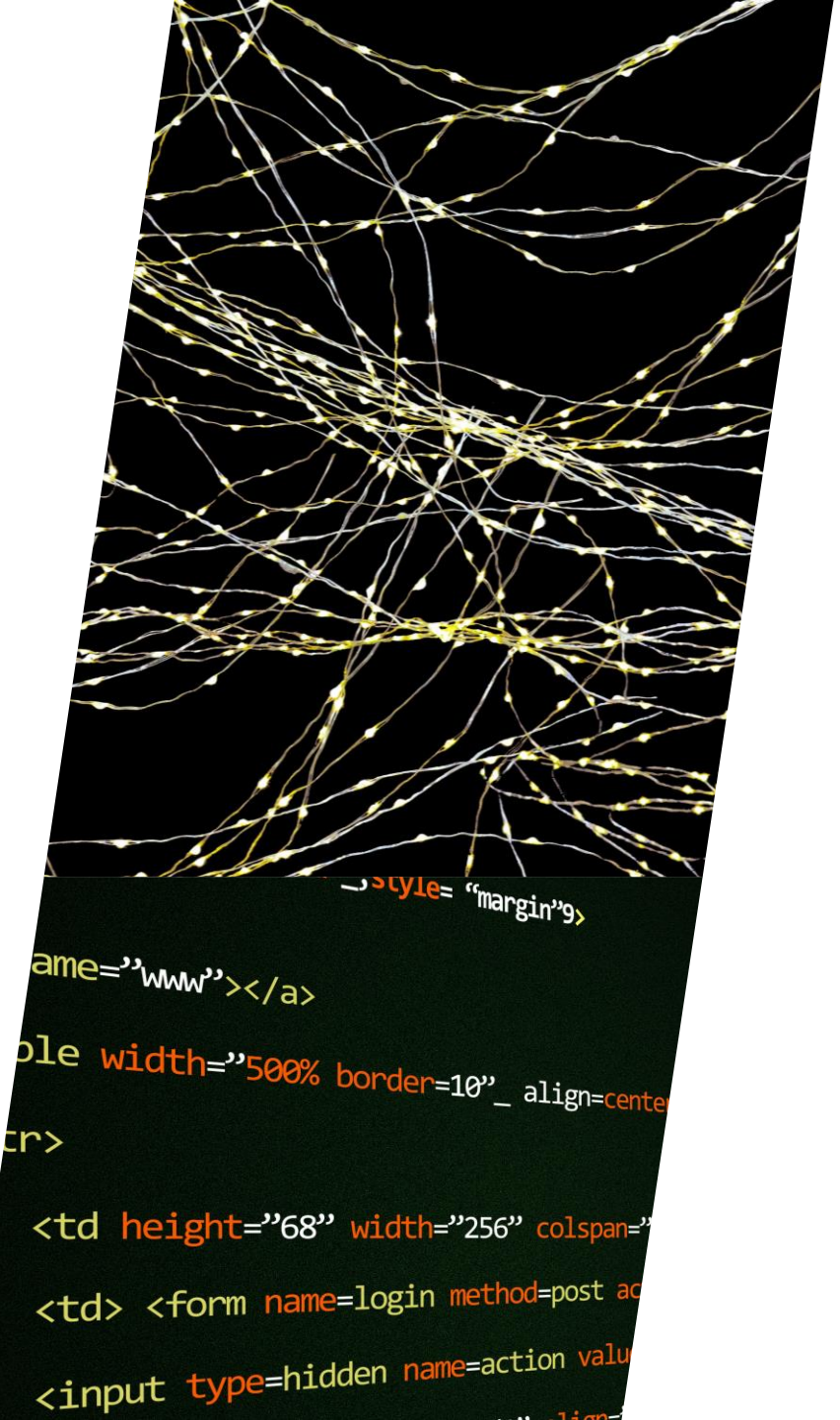
M.Sc. Mod4NeuCog : A personalized interdisciplinary training program

- Opened in September 2018
- 7 students the first year, 6 in 2019, 13 in 2020 students
- 4 Phd thesis in France (2 in Nice) and one « start up » in Brasil over the 7 who started in November.
- Our students have very different backgrounds, they are highly motivated with skills in modeling, statistics and neuro-cognition

In M1: 9 weeks internship to do in the Labs of Univ. Côte d'Azur

In M2: 5 months internship here and 5/6 months abroad or in a company.

Our Master of Science benefits now from the national equivalence to a master degree (accréditation nationale)



Structure of the program

Bootcamp: A highly interactive and intensive refresher module during the first weeks of study (07.09.-25.10)

1st semester: Core Courses and 3 Elective Courses

2nd semester: Mini-project (internship of 9 weeks max.)

+ 2 core courses: Prospective Research and Innovation / Computational Modeling and Simulation.

3rd semester: Long internship (locally based, at UCA laboratories and partner institutions)

+ Scientific communication class and 2 elective courses.

4th semester: Long internship abroad or outside academia

+ Python online module (mandatory)

6 Core Courses (mandatory)

1st Semester

- *Behavioral and Cognitive Neuroscience* (6 ECTS) Prof.: Alice Guyon & Ingrid Bethus
- *Introduction to Modeling in Neuroscience and Cognition* (9 ECTS) Prof.: Bruno Cessac

2nd Semester

- *Prospective Research and Innovation* (6 ECTS) Prof.: Benoit Miramond
- *Computational Modeling and Simulation* (9 ECTS) Prof.: Alexandre Muzy

3rd Semester

- *Scientific Communication* (6 ECTS) Prof.: Patricia Reynaud Bouret

4th Semester

- *Python online module* (2 ECTS)

Choose 5 Elective courses

***You must pick 3 during the First Semester and 2 during the Third Semester*.**

6 ECTS each

1. Stochastic models in neurocognition and their statistical inference
2. Functional neuroimaging and data processing
3. Dynamical systems in the context of neuron models
4. Knowledge, intelligence and expertise
5. Reasoning and decision making
6. Language
7. Data collection methods and statistical analysis
8. Modeling at the molecular and cellular level *NEW*
9. Deep learning, text analysis and statistics *NEW*
10. Advanced deep learning (only in M2 after completion of the Stochastic class) *NEW*

Mini-project and personal initiative

(2nd semester)

Students will conduct so-called "**mini-projects**" on their own which are guided by following objectives:

- Direct application of knowledge acquired in cognitive sciences and neurosciences.
- Creation of a model.
- Practical implementation (hardware, software/simulation, etc.).

Coordinator: Patricia Reynaud Bouret

18 ECTS

The **personal initiative project** (optional!) is for students who wish to deepen certain topics that are not necessarily addressed during class. They can freely explore and share knowledge by experimenting with other students (alongside researchers, industrial developers, artists, etc.). Students are asked to choose their own research topics and develop a project (in group or individually).

As part of their independent project, students have a small budget to spend at their discretion.

3 ECTS

Internships (3rd and 4th Semester)

The second year consists of two internships.

- The **first internship** (at a Université Côte d'Azur based lab) starts in September and ends in January.
- The **second internship** is preferably abroad or outside of academia, but exceptions may be possible, especially in the case of visa requirements.
- The Mod4NeuCog staff can assist students in finding their internships. One or both internships can be a continuation of the mini-project or the personal initiative project.
- Besides your internships, you will have to follow the courses mentioned earlier !

Master national Sciences Cognitives
Dir : E. Gerbier et D. Vistoli

Ouvert depuis septembre 2019

- **Mutualisé avec 7 parcours de Master de UCA : (Certains cours sont dispensés en anglais) et donc à cheval sur 3 campus**

- Master de Psychologie, parcours psychologie du développement, des apprentissages et de l'éducation (DAE)
- Master de Lettres, parcours Linguistique, traitements info du texte et processus cognitifs (LTITPC)
- Master de Mathématiques, parcours Ingénierie Mathématique (IM)
- Master de Psychologie, parcours Neuropsychologie et Psychopathologie Cognitive (NPC)
- Master Innovation, Entreprises, Sociétés, parcours Comportements et décisions économiques à l'ére numérique (CODEEN)
- Master de Sciences du vivant, parcours Neurosciences Cellulaires et Intégrées (NCI)
- Msc Modeling for Neuroscience and Cognition (Mod4NeuCog)

Programme de M2 (Juste un extrait …)

- *Semestre 1 : UEs optionnelles au choix (à hauteur de 18 ECTS)*

- UE: Circuits neuronaux, Neuroplasticité et Comportement (6 ECTS)
- UE: Neurobiologie des pathologies cérébrales acquises (6 ECTS)
- UE: Neurobiologie du Stress et des Emotions (6 ECTS)
- UE: Neurobiologie cellulaire et moléculaire (6 ECTS)
- UE: Méthodes et techniques de recherche avancées (3 ECTS)
- UE: Neuropsychologie cognitive et clinique (6 ECTS)
- UE: Psychopathologie Cognitive (6 ECTS)
- UE: Neurocognition et Pratiques (6 ECTS)

  ECUE: Neurocognition

  ECUE: Neurobiologie du TSPT

- UE: Neuropsychologie et psychopathologie cognitive (3 ECTS)
- UE: Decision theory (3 ECTS)
- UE : Experimental economics 2 (3 ECTS)
- UE: Linguistique 2 (6ECTS)

  ECUE: Architecture cognitive de la grammaire

  ECUE: Acquisition du langage et apprentissage des langues

- UE: Développement cognitif et théories de l'apprentissage (6 ECTS)
- UE: Numérique MSS (12 ECTS)

  ECUE: Statistical learning methods ECUE:

  Statistical computational methods ECUE:

  Technologies of Big data

Stages du Master National

- 1 stage dans un laboratoire local en M1 A partir de Janvier en même temps que cours…. Moins de 308 h (non payées)
- 1 stage de 5 ou 6 mois dans un laboratoire local ou national ou international ou en entreprise en M2.

-> le stage doit être impérativement payé !! L'institut va proposer 2 bourses

NB: Ils sont 5 M2, 4 en M1.

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THANK YOU FOR YOUR ATTENTION !

For more info visit our NeuroMod website