

# BioAcoustics Winter School

9<sup>th</sup> Ed.

January 6-17, 2025

## **BWS speakers**

*University of Saint-Etienne (ENES Bioacoustics Research Lab)*

Nicolas Mathevon, Prof (BWS organizer)

Frédéric Sèbe, Associate Researcher, Office Français de la Biodiversité

Cédric Girard-Buttoz, Researcher, CNRS

Michael Greenfield, Prof

Florence Levréro, Prof

Vincent Médoc, Associate Professor

Kasia Pisanski, Researcher, CNRS

David Reby, Prof

Jérémy Rouch, Research Engineer

ENES PhD students, post-docs

## *External*

Olivier Adam, Prof Univ. Sorbonne

Jean-Yves Barnagaud, Associate Prof, Ecole Pratique des Hautes Etudes

Elodie Briefer, University of Copenhagen, Denmark

Caroline Casey, Associate Researcher, University of California, Santa Cruz, USA

Isabelle Charrier, Senior Researcher CNRS

Catherine Crockford, Senior Researcher CNRS

Sébastien Derégnaucourt, Prof, Univ Nanterre

Paulo Fonseca, Prof, Univ. Lisbonne

Hervé Glotin, Prof, Univ Toulon

Lorène Jeantet, Post-Doc Researcher, African Institute for Mathematical Sciences, South Africa

Mirjam Knörnschild, Prof, Humboldt University Berlin (online)

Mathilde Massenet, postdoc, Lunds University, Sweden

Rafael Marquez, Senior Researcher, Museum of Natural History, Madrid, Spain

Colleen Reichmuth, Senior Researcher Univ. California, Santa Cruz, USA

Andrea Ravnani, Prof, University of Roma (Teresa Raimondi and Jelle van der Werf)

Fanny Rybak, Associate Prof, Univ. Paris-Sud

Jérôme Sueur, Prof, Museum National d'Histoire Naturelle, Paris

## **Students should bring the following equipment:**

- laptop
- headphones
- softwares: PRAAT + Audacity + CoolEdit + R with Seewave package + Python + EXCEL + CoralSoundExplorer (<https://sound-scape-explorer.github.io/docs/CSE/>)

Please check that you're able to record your voice with your laptop.

## **Location:**

Faculté des Sciences & Techniques, Bât J, Amphi J108, 21 rue du Dr. Paul Michelon, 42100 Saint-Etienne.

Online talks: <https://ujmstetienne.webex.com/meet/nicolas.mathevon>

**In bold: courses open to BWS students and students from the *master of Ethology (Univ.St-Etienne)*, *master of acoustics (Univ.Lyon)*, and EPHE students.**

All other courses & practicals: open only to BWS students (including EPHE students).

**Day 1 (Monday, January 6<sup>th</sup>, 2025)**

- 9h30-10h30**      **What is bioacoustics?** (*N.Mathevon*)
- 10h30-12h30**      **Information in sounds – from bioacoustics to ecoacoustics**  
(*F.Sebe*)
- 13h30-16h30**      **What is a sound signal?** (*Jérémy Rouch*)  
*Time/frequency representations - oscillogram, spectrogram, FFT spectrum*  
*Acoustic parameters, sound propagation, filters - Digitalization*  
*amplitude and measuring dB*  
*Short introduction to classical softwares (Goldwave, Avisoft, seewave) - Short practical on Audacity*
- 16h30-17h30**      **From microphones to loudspeakers** (*N.Mathevon*)  
*Introduction to microphones and loudspeakers*
- 17h30-18h**      **Students' projects warm-up** (*N.Mathevon*)  
*Groups of 5 students (material: their own phones and computers + free apps)*
- TOPIC: *The Lombard Effect*
- Students' expected production:*  
*\*1 Poster: Scientific context, problematic, hypothesis, method, results, discussion*  
*\*Powerpoint (10 minutes max).*

**Day 2 (Tuesday, January 7<sup>th</sup>, 2025)**

- 8h – 8h45**      The International Bioacoustic Council, other structures, scientific journals and potential fundings opportunities in bioacoustics  
(*N.Mathevon*)
- 9h-12h**      **Vocal communication in mammals** (*D.Reby*)
- 13h-14h30**      **Biological sound: Physics, digitization and a focus on amplitude**  
(*M. Greenfield*)
- 14h30-17h**      Signal processing (with a focus on PRAAT -*D.Reby*)  
*- Practicals: Introduction to PRAAT (signal manipulation -editing, resampling...) + analysis of mammal vocalizations (Frequency analysis -spectrogram, spectrum, formants...; Time analysis); Analysis and re-synthesis of human voice with PRAAT*
- 17h-18h30**      **Coding strategies in bird songs** (*N.Mathevon*)

**Day 3 (Wednesday, January 8<sup>th</sup>, 2025)**

- 8h-9h**      Presentation of the practicals (*M. Greenfield*)
- 9h15-12h15**      1<sup>st</sup> half group of students: The recording and emission chains  
Problems and solutions (Practicals; *M.Greenfield*)

2<sup>nd</sup> half group of students: SOUNDGEN & other R packages for sound analysis (Practicals; *M Massenet*)

14h-17pm 1<sup>st</sup> half group of students: SOUNDGEN & other R packages for sound analysis (Practicals; *M Massenet*)

2<sup>nd</sup> half group of students: The recording and emission chains Problems and solution (Practicals; *M.Greenfield*)

#### Day 4 (Thursday, January 9<sup>th</sup>, 2025)

**8h15 - 11h15** **Rhythm in acoustic communication** (*Teresa Raimondi and Jelle van der Werff*)

**11h45-12h45** **Diversity and function of bat vocalizations** (*Mirjam Knörnschild online*)

**14h-16h** **Acoustic communication in frogs I** (*R.Marquez*)

**17h30 - 19h** **Understanding the acoustic world of animals from within** (*C.Reichmuth – C.Casey - online*)

#### Day 5 (Friday, January 10<sup>th</sup>, 2025)

**8h30-12h30** **Field experimentations in bioacoustics: problems and solutions** (*I.Charrier*)

**13h30-14h30** **Acoustic communication in frogs II** (*R.Marquez*)

**14h30-18h30** **Aquatic bioacoustics: from sound to silico – Practical** (*P.Fonseca*)

#### Day 6 (Monday, January 13<sup>th</sup>, 2025)

**8h30-12h30** **Statistics for bioacoustics** (*JY Barnagaud*)

**14h-18h** **Introduction to ecoacoustics** (*J.Sueur*)

#### Day 7 (Tuesday, January 14<sup>th</sup>, 2025)

**9h30-10h45** **Bioacoustics as a tool for social network studies (monkeys and apes)** (*F.Levréro*)

**11h-12h** **Emerging complexity in primate communication and brain pathways** (*C. Crockford*)

**13h-15h** **Birdsong studies in the laboratory: technical advances in tracking vocal changes** (*S Derégnaucourt*)

**15h30 – 17h** **Acoustic communication in apes** (*C. Girard-Buttoz*)

**19h30-22h** **Evening event (open to the public)**

<https://www.chanteurs-oiseaux.com/>

Jean Boucault and Johnny Rasse are two nature lovers with a passion for birds and their poetry. Imitating their songs quickly became a reflex, a game, a passion. They then sought to make their gift more musical, turning it into an art and becoming true bird singers.

**Maison de l'université, 10 rue Tréfilerie, Saint-Etienne**

*All BWS students are welcome (no need of registration)*

### Day 8 (Wednesday, January 15<sup>th</sup>, 2025)

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|------------------|--|
| <b>8h – 12 h</b> | <b>Whales' bioacoustics</b> ( <i>O.Adam</i> )                |
| 14h – 18h        | Artificial Intelligence and Bioacoustics ( <i>H.Glotin</i> ) |

### Day 9 (Thursday January 16<sup>th</sup>, 2025)

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|--------------------|---|
| 8-10 h matin       | Deep learning for bioacoustics ( <i>Lorène Jeantet</i> )  |
| <b>10h30-12h</b>   | Vizualization and quantification of soundscapes using <i>SoundScapeExplorer</i> software ( <i>J.Rouch</i> ) |
| <b>13h-14h30</b>   | <b>Aquatic ecoacoustics</b> ( <i>V Médoc</i> )  |
| <b>14h30 – 16h</b> | <b>Bioacoustics as a monitoring tool for fresh waters</b> ( <i>F.Rybak</i> )                                |
| <b>16h – 18h</b>   | <b>Acoustic studies in Arthropods</b> ( <i>F.Rybak</i> )  |

### Day 10 (Friday January 17<sup>th</sup>, 2025)

- |                      |   |
|----------------------|---|
| <b>8h – 10h30</b>    | <b>The vocal expression of emotions</b> ( <i>E.Briefer - online</i> ) |
| <b>10h45 – 11h45</b> | <b>Human non-verbal signals</b> ( <i>Kasia Pisanski</i> )             |
| <b>11h45-12h15</b>   | <b>Applications of bioacoustics</b> ( <i>F.Sèbe</i> )                 |
| <b>14h-16h</b>       | <b>Final exam QCM</b>   |

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### Bioacoustics Resources (for your information)

[https://docs.google.com/document/d/10APGahxU\\_GJewO8mkN2wzG0y-LHw3p\\_TAcYJD-dHAQmg/edit?tab=t.0](https://docs.google.com/document/d/10APGahxU_GJewO8mkN2wzG0y-LHw3p_TAcYJD-dHAQmg/edit?tab=t.0)

<https://rhine3.github.io/bioacoustics-software/>

<https://sound-scape-explorer.github.io/docs/CSE/>

<https://github.com/sound-scape-explorer/coral-sound-explorer>

<https://www.nhbs.com/the-voices-of-nature-book>

