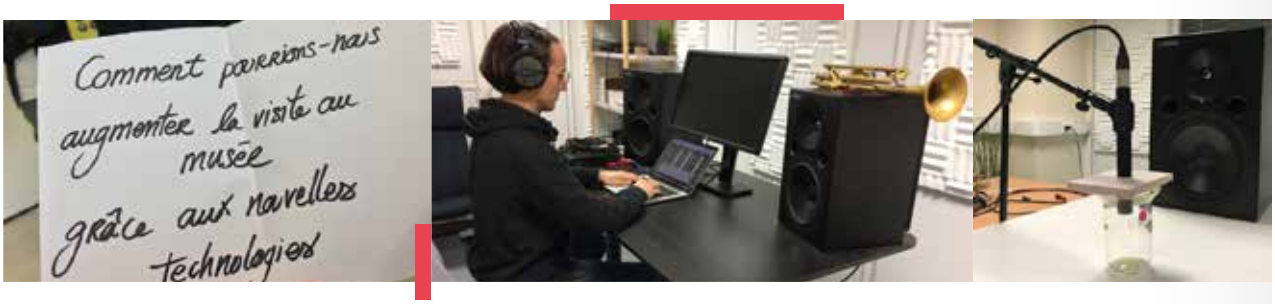
3RD YEAR PROFESSIONAL OPTION

SCIENCE AND MUSIC

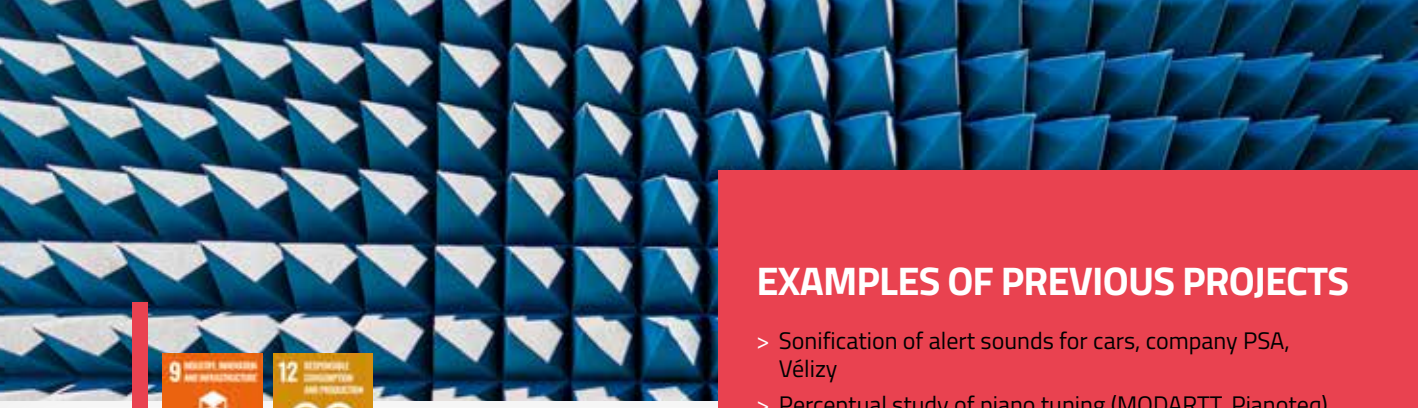
The Science and Music option focuses on a specific sector, namely music, covering the main aspects from a scientific perspective: how musical instruments work, recording and distributing music, managing music databases and new methods of broadcasting and recommending music.

The option offers students who are highly motivated by music (e.g. accomplished players of a musical instrument), and intending to pursue an engineering career in this sector, the opportunity to acquire the necessary skills. Whilst there is no set requirement as to prior musical training or performance (musical instrument, composition, sound techniques), strong motivation and an open mind are essential.



COURSE CONTENT

- **Acoustics - Signal - Perception:** Basics for musical signal processing – Introduction to psychoacoustics
- **Musical Acoustics:** How the main families of musical instruments work – Room acoustics – audio engineering – History of music.
- **Digital music:** MIR (Music Information Retrieval) - Indexation and compression of music - detection of musical genre - Recommendation systems (Big data)
- **Project:** Personal project (musical production, instrument making and design, sound synthesis, automatic musical composition etc.)



CAREER PROSPECTS

Opportunities exist across different sectors of activity within various structures (company, start-up, institution):

- Instrument design, production monitoring, innovation
- Equipping listening areas
- Sound-synthesising software - digital audio processing, music production
- Music and emotion - neurosciences
- Music Information Retrieval (MIR) (recommendation systems, transcription, categorisation)
- New supports for broadcasting music
- Research (master, PhD)

TEACHING STAFF

HEAD OF OPTION

Jean-François PETIOT (Professor at Centrale Nantes, LS2N)

LECTURERS

Mathieu LAGRANGE (CNRS, LS2N), Vincent LOSTANLEN (CNRS, LS2N)

EXTERNAL SPEAKERS

Frédéric ABLITZER (LAUM, Le Mans), Pierre AUMOND (Université Gustave Eiffel), Sébastien DENJEAN (Stellantis), François Xavier FERON (IRCAM Paris), Damien JACQUET (Arbane Group), Nicolas MISDARIIS (IRCAM Paris), Robin TOURNEMENNE (Modartt), Romain VIALA (ITEMM, Le Mans).

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EXAMPLES OF PREVIOUS PROJECTS

- Sonification of alert sounds for cars, company PSA, Vélizy
- Perceptual study of piano tuning (MODARTT, Pianoteq)
- Sound design applied to sound spatialisation (Arbane group)
- Study of the effect of acoustic bridges on the perceived quality of trumpets - see ISMA 2019 Conference papers
- Sonification of the measurement of the human skin, CLARINS company, Pontoise, See SMART 2019 Conference papers
- Rapid prototyping for musical instruments (mouthpieces), ITEMM, Le Mans.
- Production of a song. Recording, mixing, mastering.
- Automatic generation of melodies with Markov chains

CONFERENCES

- «La facture instrumentale». Romain Viala, Ingénieur de Recherche à l'ITEMM (Institut Technologique Européen des Métiers de la Musique)
- «Le design sonore». Nicolas Misdariis, Equipe de recherche Perception et Design sonore de l'IRCAM (Institut de Recherche et de Coordination Acoustique Musique).
- «Musique et interaction». Diemo Schwarz, chercheur à l'IRCAM. Mini concert de présentation de la musique interactive et d'interfaces tangibles.
- «Une petite histoire de la modernité musicale au XXième siècle». François Xavier Feron, IRCAM.
- Piano acoustics - sound synthesis - Robin Tournemenne, MODARTT