Evaluation program

The Master 2 Neurosciences - Neurophysiology of Perception and Sensory Evaluation programme offered by the University Lyon 1 has the overall aim of training professionals capable of understanding the cognitive, physiological and emotional aspects of perception in the conception, realisation and interpretation of studies focussing on the end user, whether this be a consumer, user, patient, health care professional … A typical mission might consist of measuring the impact of a given product on the sensory perceptions (visual, auditory, tactile, olfactory …) of a person coming into contact with this product.

The course focuses principally on the theoretical and methodological bases of cognitive neurosciences. At the end of the course students should be able to find solutions to a practical problem posed by an industrialist using their knowledge of general neuroscience and their specific competences in sensory analysis. It is the specificity of its content that constitutes the originality and major interest of this course.

The skills acquired by students during their training will hone their ability to « transform » an industrial problem into a neuroscientific question that they are fully equipped to answer through suitable methodical investigation. The various teaching modules included in the course will allow students to acquire the skills necessary to: define and reformulate a demand so as to fully understanding the needs of the requestor; to construct a project, to master the principal analytical tools (sensory tests, questionnaires, physiological investigations …); master the tools for treating collected data (statistical); write a report and propose solutions ….

The areas of application are essentially industrial and are of particular interest to the agro-food, cosmetics, textile, bioengineering, automobile and environmental industries. Our programme prepares students for posts in research and development (e.g. sensory analysis aiding in product conception), marketing (e.g. analysis of consumer preferences and expectations) and quality control.

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Teaching units (TU)- Programme details

« Skills based » transversal teaching modules

- **Statistical and bibliographic tools** (6 ECTS credits)
  1. To present the main principles of the scientific approach. The introduction to a problem is mainly epistemological: rules and difficulties/limits inherent in the formulation of a problem, producing a hypothesis, how to test this hypothesis experimentally and then interpret the results. This part of the course ends with a series of practical exercises covering the areas of physiology and the neurosciences and requiring methodological consideration of subjects covered in other teaching modules of the Masters programme.
  2. To extend student's knowledge of the use of statistics as required for scientific research; the following topics will be covered:
     - Nonparametric statistics
     - ANOVA with two or more variables
     - Multiple regression analysis (linear, logistic, mixed)
     - PCA/FCA
     - Discriminant analysis
     - Classification methods
  3. To make students aware of the importance of scientific communications, both as means of reporting on scientific research and for the simple transfer of information. To this end students will be taught to carry out documentary research, to write papers and present the results of their work in a variety of formats (reports, oral presentations etc.)

- **English** (3 ECTS credits)

  Communication skills in written and spoken English with the accent on the scientific domain.

- **Project Management** (3 ECTS credits)

  1. To present the methodological bases of project management, whether this be for the elaboration of the project (identification of needs, formulation of objectives, identification of constraints, definition of solutions in terms of content/scope/quality, delay, budget/resources…), for successful completion of the project (setting up and implementation of each step, pilot committees…), or for its management (setting up of partners and follow-up procedures, empowerment and motivation of teams, fine-tuning, communication and valorisation…).
  2. To put into practice the theoretical, methodological and technical knowledge acquired in other disciplines within the Masters programme. Students will be required to carry out a 'mission' consisting of responding to a problem put out to tender by an industrial partner. In response to a bid solicitation the students, working in small groups and in competition with each other, must conceive an exploratory project using sensory analysis to directly respond to the problematic they are given. They will be required to design the necessary analyses, as well as present the materials and methods required to achieve their aims and the financial cost of their project. A written report summarizing the work will be drawn up at the end of the course, distributed to the various partners and defended before a jury composed of university staff and non-academic members drawn from the world of research or industry. At the end of the evaluation of the project, the groups will come together to put the proposed project into operation (see **Applications in the World of Business**)

Specialised teaching modules

- **Psychophysiology and Measuring Perception** (9 ECTS credits)

1. To develop the theoretical bases necessary for each student's professional development i.e. the neurobiological bases for treating sensory input. Three topics will be addressed:

   - The senses and sensory processing (sensory processing disorders; sight; smell; hearing; touch; taste and flavours; omesthesia and sensorimotor control; sensory integration and intermodal interactions; conscious and unconscious perception)

   -Memory and perception (role of memory in perception; encoding, recall and recognition of information)

   -Emotion and perception (neuronal bases of emotion; neuromodulators, social cognition)

2. To train students in the use of the tools used to measure and quantify that are indispensable when carrying out neurosensory and perception analyses. In conjunction with the theoretical content, practical work will give students grounding in the techniques for controlling and measuring stimuli and in how to record the physiological and behavioural responses to these stimuli.
3. The S-R paradigm
   Techniques and instrumentation (e.g. luminance, chromatography, physical chemistry, audiograms...)
   Standard parameters (intensity, frequency, variability...)
   Measurement of physiological responses
   Measurements with high temporal resolution: (EEG (EP), SEEG, MEG)
   Measurements with high spatial resolution: (PET, fMRI)
   Measuring the action of the peripheral nervous system (respiration, EDR, ECG, temperature)
   Measuring motor activations: (EMG, kinematic)
   Measuring behavioural responses: chronometry (reaction times), sensory psychophysics (taste, hearing and smell thresholds)
   Sensory evaluation (discrimination tests, profiles....)
   Methods for analysis of spontaneous behaviour
   Consumer tests (qualitative and quantitative)

- **Sensory evaluation and market research** (3 ECTS credits)

Market research using consumer testing is a requisite step in all areas reliant on sensory analysis. The aim of this module is to give students the principal tools they will need in this area. Subjects covered include:

1. Sensory analysis

   After a look at all the various discriminative and descriptive techniques in existence, the module will then focus on the ever more widespread technique of sensory profiling, a technique that must be mastered both in theory and in practice. This will give students the means to constitute and train a panel of experts and then to collect, analyse and interpret the results obtained.

2. Quantitative consumer studies

   The module will look at the aims and principles of product testing and the various means of carrying out such tests and interpreting their results. Particular attention will be paid to the recruiting of consumers, to the choice of response scales and statistical treatment of data obtained. Preference mapping will also be studied both in theory and in practice.

3. Qualitative consumer studies

   The main qualitative principles will be covered (aims, principles, methods, treatment): focus groups, individual interviews and observations in situ.

During the practical sessions, students will be required to carry out a consumer study on two types of product, one a food and the other a textile, within the confines of the university premises. Each constituted group must define the sensory profile of their student population, carry out a consumer survey and qualitative studies and perform preference mapping. Jointly responsible for the statistical analysis of the data obtained they will then be required to present their results to a jury.

- **Applications in the World of Business** (3 ECTS credits)
  1. To present the characteristics of the functioning of businesses and the areas of expertise looked for in the areas of neuro-sensory analysis and sensory perception. Guest speakers from the world of business will present the finalities, methods and constraints of their work through the presentation of typical projects and particular missions on which they have worked.
  2. To inform students regarding the law and working practices in this domain (ethics, confidentiality, patents etc.)
     The module will include the following: *The major functions of a company and the roles of each department; The role of the project engineer; Founding a company; Industry specificities (Cosmetics, Agro-food, Environmental, Transport, Automobile, Textiles and Clothing industries); Legislation, confidentiality and patents; Ethics, Health and Safety, Testing protocols, Legislation for the cosmetics industry; Quality; Product safety, AFNOR & ISO 2000 certification …*

  3. Implementation of the project drawn up as part of the Project Management module. In collaboration with a company and under the tutelage of a member of the teaching staff a pilot study may be begun using the facilities of the sensory analysis laboratory within the university. The results will be presented to the company.

- **Practical experience – Work placement**: 6 months (for those not following the course under the sponsorship of their employers)

  Period wherein the skills acquired during the masters course can be put into practice.