

Higher Education in acoustics in the framework of the LMD system, from College to PhD. The case of the University of Maine (Le Mans)

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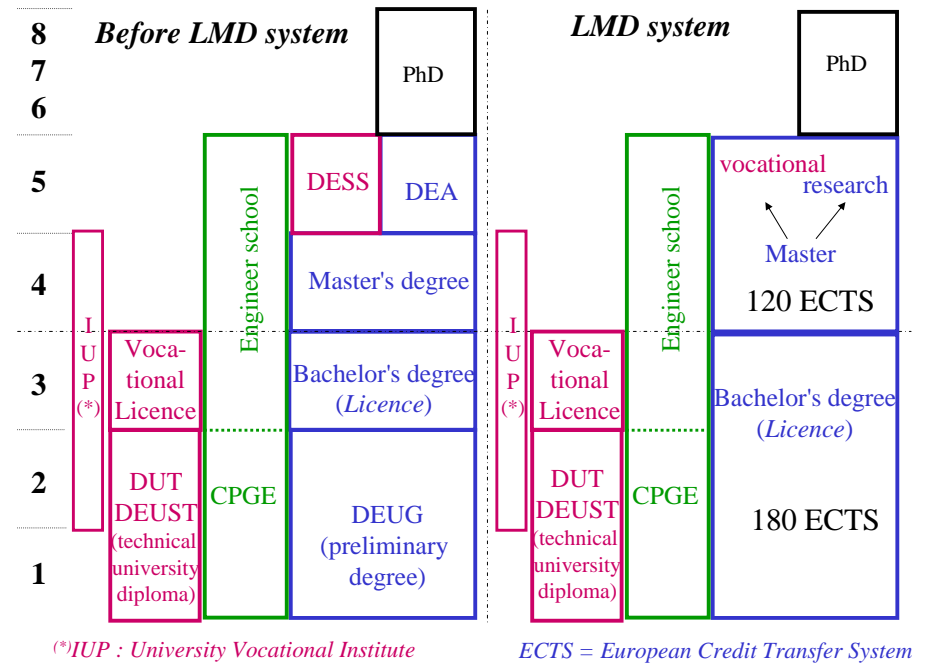
LAUM

The L M D system

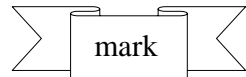
Bachelor's
(Licence) *Master's*
(Master) *PhD*
(Doctorat)

with the help of

Michel Combarnous (University Bordeaux 1, President of the French Mechanical Association - AFM),
and *Michel Lebouché* (Head of the Scientific, Technic and Pedagogic Mission - French Ministry of Education)



ECTS : European Credit Transfer System



usual *volume of work* for the student

quality of the results obtained by the student



A student obtains the "credits" of a lecture, only if he obtains a good enough ECTS mark.



ECTS GRADING SCALE

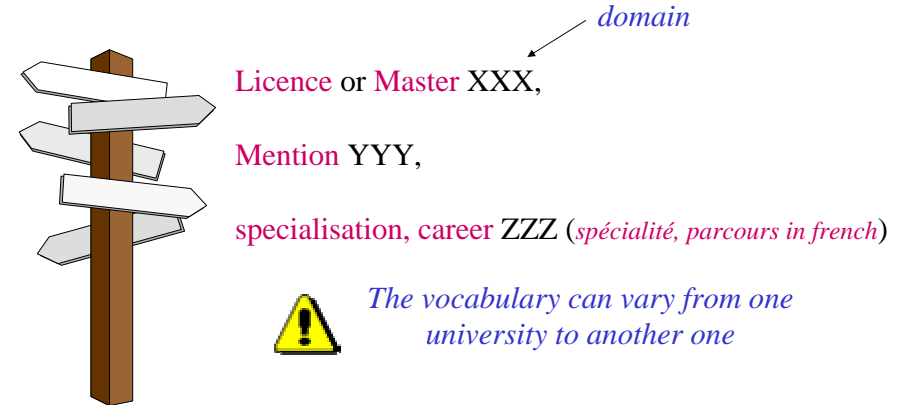
ECTS mark	Percentage of successful students normally achieving the grade	Comment	Definition
A	10 %	EXCELLENT	Outstanding performance with only minor errors
B	25 %	VERY GOOD	Above the average standard but with some errors
C	30 %	GOOD	Generally sound work with a number of notable errors
D	25 %	SATISFACTORY	Fair but with significant shortcomings
E	10 %	SUFFICIENT	Performance meets the minimum criteria
FX		FAIL	Some more work required before the credit can be awarded
F		FAIL	Considerable further work is required

http://europa.eu.int/comm/education/programmes/socrates/ects_en.html

THE LMD SYSTEM: TRANSITIONAL PHASES

- First setting-up in October 2003 (some precursors shortly before), gradual (year after year) or massive (for instance Univ. Bordeaux 1), *in the framework of four-year contracts.*
- Provisionally, the former diploma DEUG (1st and 2nd years of the Bachelor's degree), and "Maîtrises" (1st year of the Master's degree) are maintained.
- Medicine: for the moment, nothing has changed.
- The institutions supervised by other ministries (architecture, agriculture, industry) are involved in the reform.

THE VOCABULARY

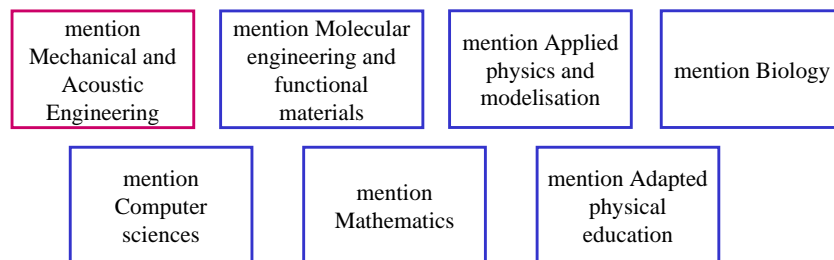


Examples of a small university (Univ. du Maine, Le Mans) and of a big university (Paris VI)

SMALL UNIVERSITY: Université du Maine (1/2)

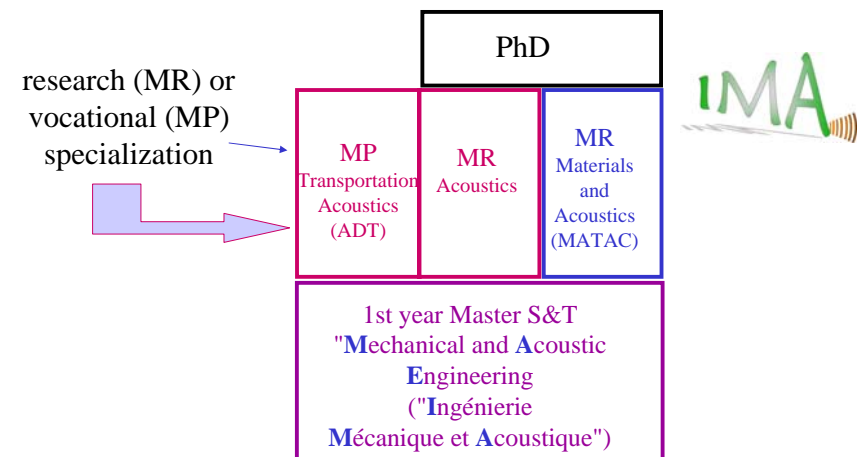


- ➔ 5 **domains** including the Sciences and Technologies domain
- ➔ 5 Masters, including the Sciences and Technologies Master which includes **7 mentions**



(*)UFR: University department

SMALL UNIVERSITY: Université du Maine (2/2)

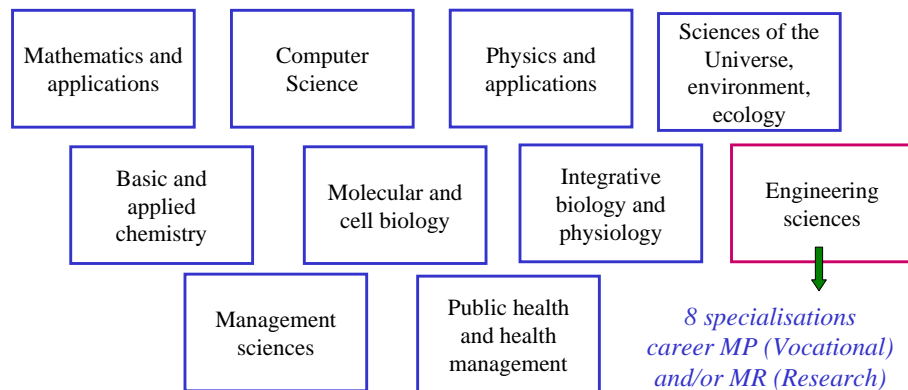


BIG UNIVERSITY: PARIS VI

13 UFR(*) : 9 scientific UFR, 4 medical UFR + internal Units

→ **only 1 master**: Sciences and Technologies

→ **10 mentions** → **60 specialisations**



(*)UFR : University department

Masters in France: a first assesment

- End of May 2005: more than 80 % of the "masters" proposed by the institutions has been evaluated (four-year contracts, the remaining concerns Paris and the surrounding departments) (a final assesment at the end of September)
- Except Paris and the surrounding departments,
 - ✓ **1751 mentions** (1020 different titles)
 - ✓ including 5841 specialisations (3083 vocational, 2758 research) are accredited (by the Ministry of Education)
- The specialisations, in particular "research", are often involved in several institutions, via co-habilitations.

Distribution of MASTERS' mentions between the different fields (linked to the scientific boards of the French Ministry of Education)

● Mathematics (4,6 %)	80
● Physics (3,5 %)	62
● Sciences of Earth, Universe and Space (3,6 %)	63
● Chemistry (4,3 %)	75
● Biology, Medicine, Health (8 %) (except strictly medical studies)	140
● Human sciences, Humanities (25,2 %)	441
● Social sciences (30 %)	525
● Engineering sciences (6,5 %)	114
● Information and communication technology sciences (9,8 %)	172
● Agronomical and ecological sciences (4,5 %)	79

THE PhD DEGREE COURSE

- The PhD degree is prepared over a 3-year period following a research master (nothing has changed).
- The laboratories and "doctoral groups" are put together in doctoral schools (*écoles doctorales in french*). Size : 50 PhD/year for instance.
- These doctoral schools propose some lectures to 1st-year and 2nd-year PhD-students. They must pass 4 lectures (about 25 hours each). They can validate lectures in other doctoral schools.

The teaching of acoustics at the University of Maine (Le Mans - France)



LAUM

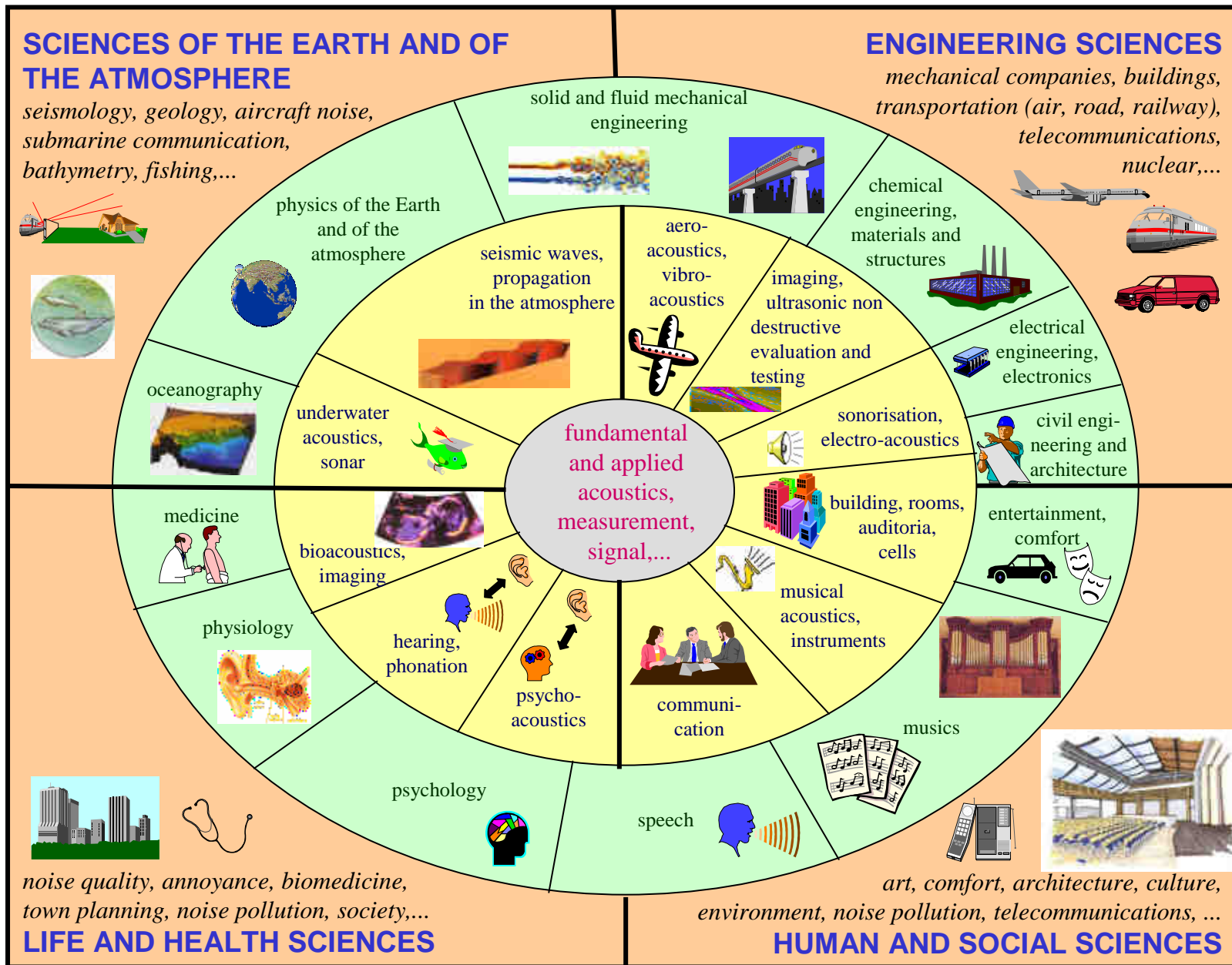
Laboratoire d'Acoustique de
l'Université du Maine
UMR CNRS 6613



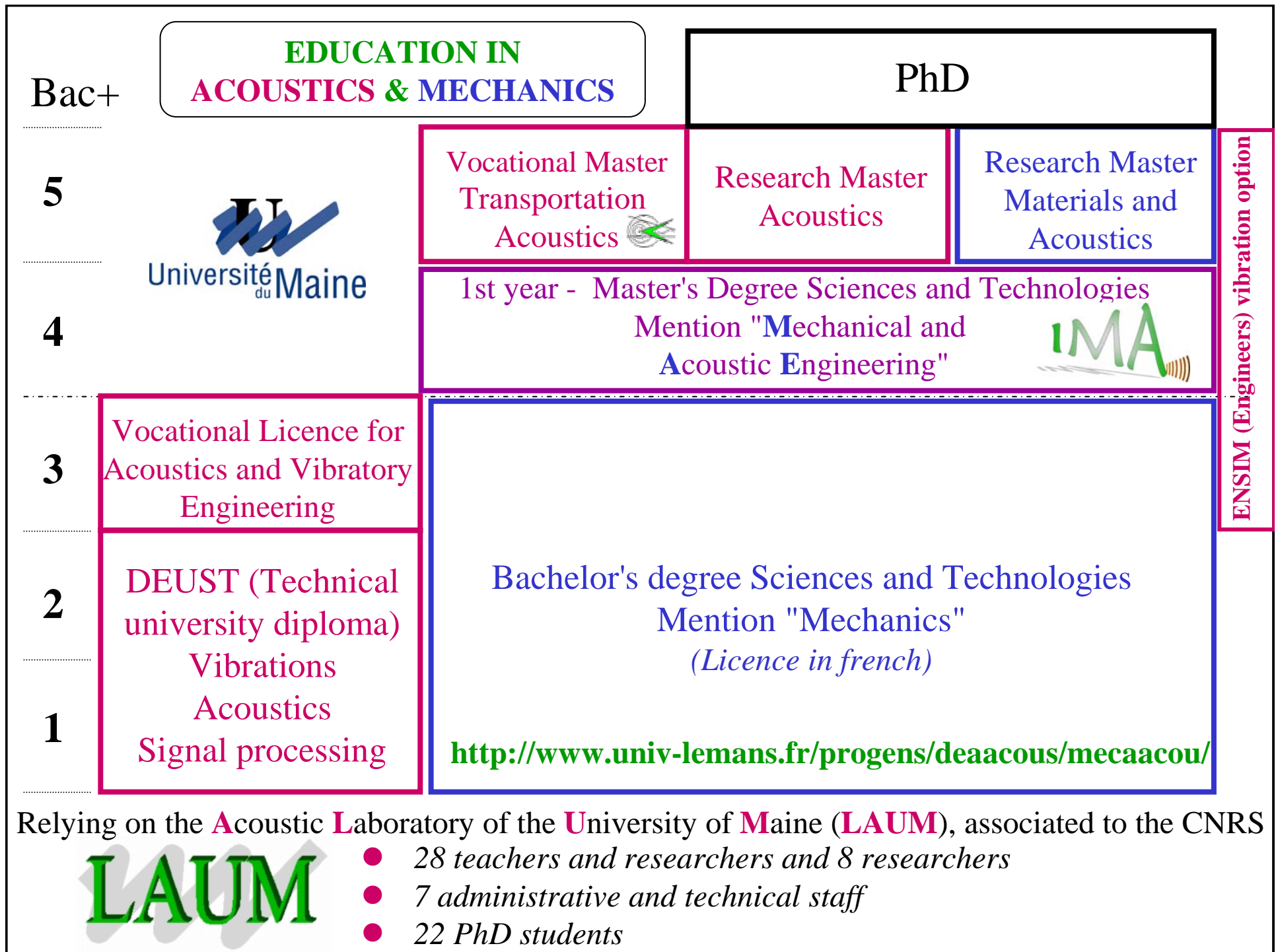
ENSIM



The world of acoustics



Synoptic view of acoustic skills : the four fields of activity, the engineering domains, the specialised aeras
 (from outside to center). Adapted from R.B. Lindsay, *J. Acoust. Soc. Am.*, **36**, 1964, by Michel Bruneau, Pr., and Catherine Potel, Pr., French Acoustical Society



Scientific and Technical University
Diploma (DEUST)
Vibrations Acoustics Signal
processing (VAS)
at the University of Maine

Aims

- *Short courses*, with a vocational purpose
- Training of *higher technicians* in *acoustic and vibratory measurements*.
- *Unique training in France*, created in 1990

Work fields

- **Transportation**
 - ◆ cars: manufacturers (PSA, Renault) and car parts manufacturers
 - ◆ railway, subway (SNCF, RATP)
 - ◆ maritime
 - ◆ aircraft, aerospace
- **Acoustic engineering**: noise and annoyance
- **Building acoustics**: house, flat, public and manufacturer offices
- **Electro-acoustics**: loudspeaker, baffle
- **Sonorisation**: public and manufacturer offices, auditoria
- **Consultancy (companies)**: building and room acoustics, environmental acoustics, vibro-acoustics
- **Medical acoustics, submarine acoustics, geodynamics** ...

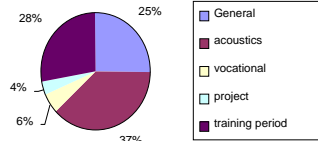
Missions of DEUST VAS' level

Several examples:

- **Manufacturers**
 - setting-up of acoustic and vibratory experimental set-up
 - measurements
 - data processing
 - technical writing
- **Consultancy companies**
 - environmental intervention
 - computing simulations
 - noise measurements in factories or outside (environment)
 - implementation of solutions
 - measurement in order to check.

Contents of the training courses

- ♦ **general training (450 h)**
(Physics, Electronics, Mathematics, Computing, Scientific and technical english, writing and oral expression)
- ♦ **vocational training courses for an acoustician (670 h)**
(Mechanics, Vibrations, Thermodynamics, Physical acoustics, Electro-acoustics, Signal processing, Instrumentation, Sound perception)
- ♦ **vocational training courses** taught by professional engineers (100 h)
Two optional subjects : Noise and vibrations, Speech and manufactured Sonorisation
- ♦ **projects and training periods**
 - 13-weeks training period in a company, in France or abroad (2nd year)
 - 32 hours/year of tutorials projects



Continuation of studies

- ♦ General Bachelor's degree: physics, mechanics, electronics
- ♦ Vocational Licence (environment ...)
- ♦ Scientific and Technical Master (audiovisual ...)
- ♦ Engineering schools (sensor, vibrations, environment ...)

How to apply ?

- Having a Scientific or Technical *Baccalaureat*
- Enrolment subject to an *interview*
- Possible *direct access* in *2nd year* after validation studies, subject to an application file and an interview (DUT, BTS, DEUG MIAS, SM, ...)
- Application file can be requested *from 15th June*

Web site: <http://www.univ-lemans.fr/progens/deustvas>

Address

Université du Maine
Faculté des Sciences et Techniques, Laboratoire d'Acoustique
In charge of 1st year (DEUST VAS 1) : Bruno Brouard,
In charge of 2nd year (DEUST VAS 2) : Laurent Simon,
Avenue Olivier Messiaen
72 085 LE MANS Cedex 9 - France

Web site

<http://www.univ-lemans.fr/progens/deustvas>

Vocational Licence of mechanics,
speciality

"Acoustic and Vibratory Engineering"

Vocational Licence for Acoustic
and Vibratory Engineering

Why ?

- Since 1990, Deust Vibrations-Acoustics-Signal VAS
- Follows the technical and technological evolution of the trades in acoustics
- Answers the diversification of the industrial demands for modal analysis, propagation in materials, flow, building acoustics and so on.

Vocational Licence for Acoustic
and Vibratory Engineering

Work fields

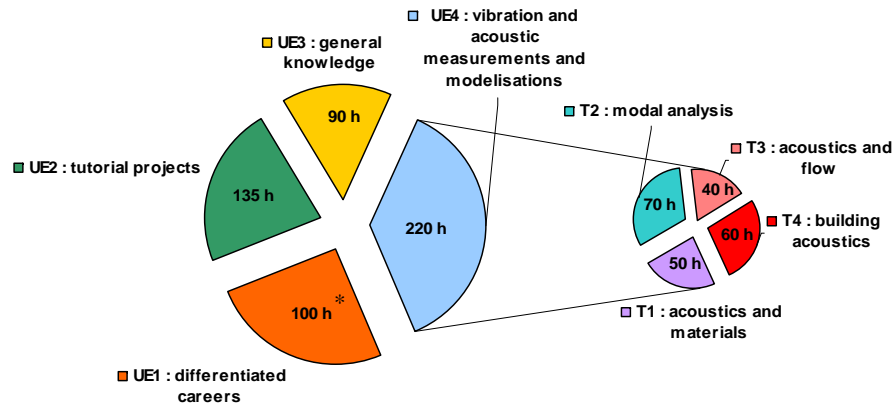
- *Car area* (measurements, result analysis, wide skill on the whole experimental set-up) and more generally *transportation area*
- *Consultancy* (building or room acoustics, modal analysis,)
- *Else...* (electroacoustics, "sonorisation", ...)

Vocational Licence for Acoustic
and Vibratory Engineering

Who can apply ?

- Preliminary degrees
- Technical University Diploma
- DEUST VAS
- Continuous training, (in-house) training

Contents of the training courses



UE : Teaching Unit (Unité d'Enseignement in French)

* : per student

+ 16 week-training period

Tutorial projects

- Three or four students per group
- Different university and/or professional origins
- Beginners' course in virtual instrumentation and/or MATLAB software
- Learning to manage a project
- Proposed by the education staff, with links to the industrial demands

Practical classes (1/4)

- **Materials and acoustics**



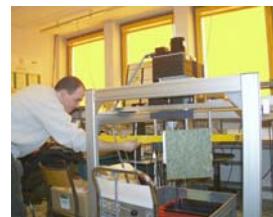
Measure of the absorption of porous materials



Ultrasonic dispersion and attenuation in a porous ceramics



Tortuosity and viscous characteristic length



Reflection coefficient of compressed fibrous materials

Practical classes (2/4)

- **Modal analysis**



Modal analysis of a plate



Chladni plate



Modal analysis of a beam



Practical classes (3/4)

- **Acoustics and flow**



Subsonic wind tunnel



Reflection and transmission coefficients



Exhaust

Practical classes (4/4)

- **Environmental and building acoustics**



Wall transparency measurement



Omnidirectional source and reverberant room



Vocational Licence for Acoustic and Vibratory Engineering

How to apply ?

- Application file can be requested by regular mail or on Internet
- Dead-line for returning application file : **15th April**
- Answer : **Beginning of May**

Web site: http://www.univ-lemans.fr/progens/licpro_acvib

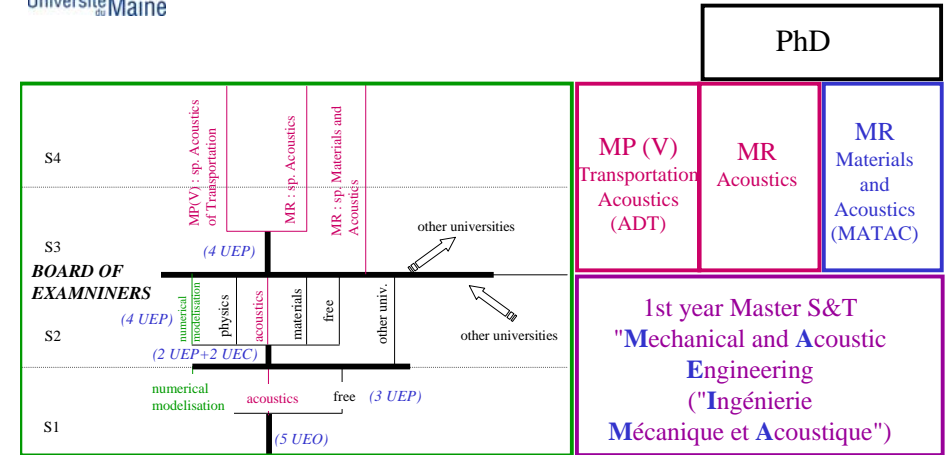
Vocational Licence for Acoustic and Vibratory Engineering

Address

Université du Maine
Faculté des Sciences et Techniques, Laboratoire d'Acoustique
M. Jean-Pierre DALMONT
Président du jury de la Licence Professionnelle de Mécanique,
"spécialité Ingénierie Acoustique et Vibratoire"
Avenue Olivier Messiaen
72 085 LE MANS Cedex 9 - France

web site http://www.univ-lemans.fr/progens/licpro_acvib

Master Sciences and Technologies, *mention* "Mechanical and Acoustic Engineering"



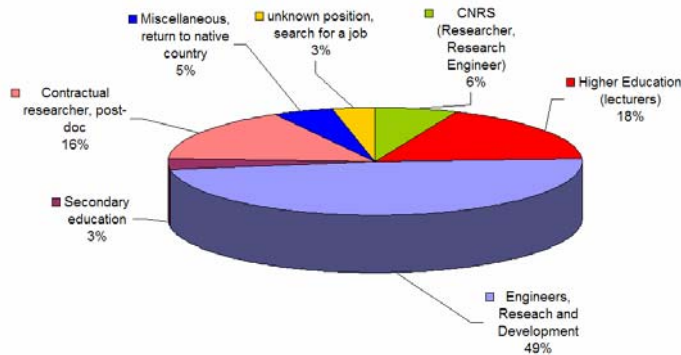
Relying on the Acoustic Laboratory of the University of Maine (LAUM), associated to the CNRS



- 28 teachers and researchers and 8 researchers
- 7 administrative and technical staff
- 22 PhD students

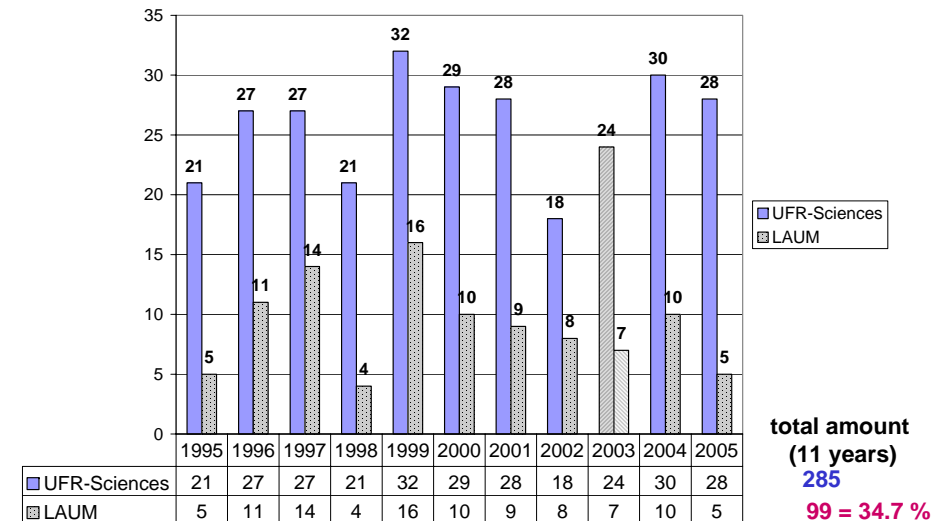
Acoustic Research Master

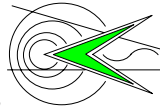
- Theoretical training courses as a preparation degree for research
- Possibility to go on PhD
- Possibility to find an engineer/research job in a company



Position of former Acoustic PhD students 1997-2002

NUMBER OF PhD THESIS DEFENDED AT SCIENCES AND TECHNICS UNIVERSITY DEPARTMENT (UFR) AND AT ACOUSTIC LABORATORY (LAUM) (LAST 10 YEARS)





INITIAL TRAINING

CONTINUOUS TRAINING

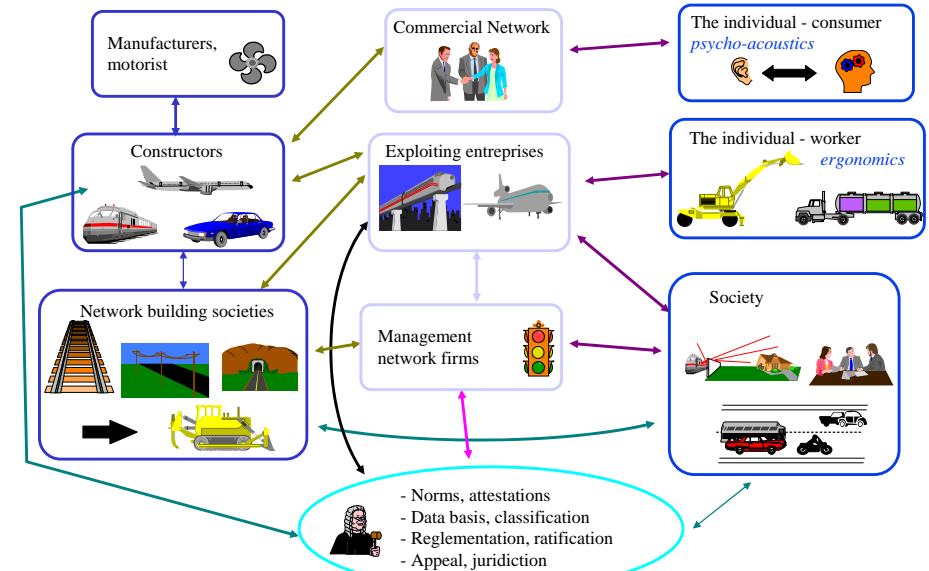
NOISE TECHNOLOGIES AND HUMAN SCIENCES
IN ORDER TO TRAIN SPECIALISTS CAPABLE OF DIALOGUING WITH
ALL THE PARTICIPANTS OF TRANSPORTATION ACOUSTICS

Partnership with:




http://www.univ-lemans.fr/progens/deaacous/master_MP_ADT.htm

THE DIFFERENT PARTICIPANTS TO TRANSPORTATION ACOUSTICS



VOCATIONAL MASTER "Transportation Acoustics"



- Professional partnerships: 
- September to December
 - ✓ pre-required courses: acoustics, mathematics, signal processing
- October - December: Fundamentals courses and professional seminars
 - ✓ acoustics, vibrations, vibro-acoustics, signal processing,
 - ✓ numerical methods, physio-acoustics
 - ✓ Experimental and numerical practical classes in acoustics
 - ✓ Law courses (Law department, University of Maine)
- January - beginning of February
 - ✓ 1 week at CSTB - Grenoble
 - ✓ 2 weeks at INRETS - Bron
 - ✓ 1 week at LCPC - Nantes
- Mid-February: 1 week in the suburbs of Paris (MATE, ADP, ASFA, DGAC, ...)
depending of
- End of February: Case study
- March - July: training period
- September: report and examination (viva voce) ; board examination

Materials and Acoustics Research Master (MATAC)



- Experimental methods for mechanics and signal processing
- Mechanical behavior of composite materials
- Damage and break of materials
- Acoustics of poro-elastic materials
- Vibrations-Vibroacoustics
- Propagation solid media, Non Destructive Testing, sensors and measurement
- Numerical methods
- Rheology of polymers
- Bibliographic seminars
- Training period

Master's degree Mechanical and Acoustic Engineering

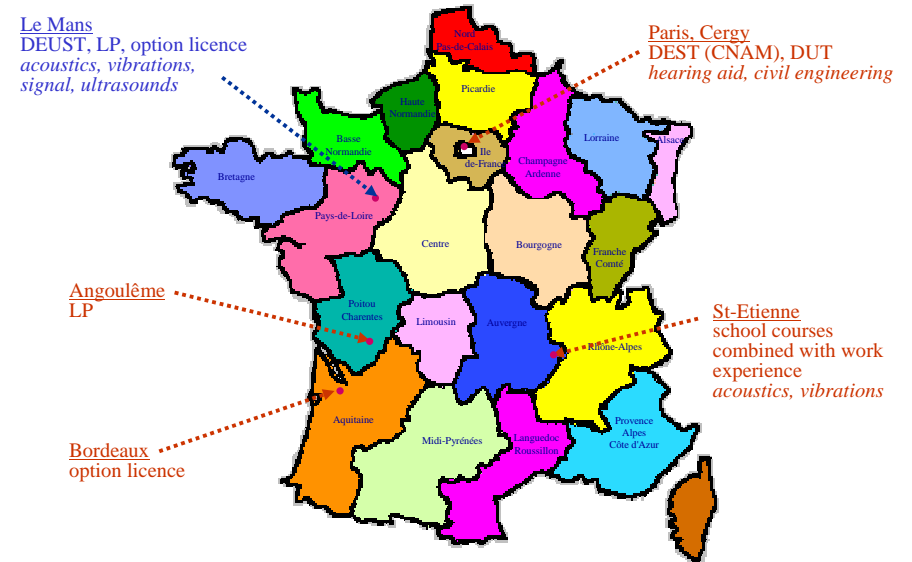
Address

- Registrar's office (Sciences and Technics department of University) : 33 - 2 43 83 32 06 / 07
- Université du Maine, Laboratoire d'Acoustique de l'Université du Maine (LAUM), UMR CNRS 6613, Avenue Olivier Messiaen, 72 085 Cedex 9
 - In charge of the whole master: **Claude Depollier**
 - Coordinatrice: Catherine Potel
 - First year: Olivier Richoux
 - Second year:
 - research specialisation "acoustics": Claude Depollier
 - research specialisation "material and acoustics": Rachid El Guerjouma
 - vocational specialisation "transportation acoustics": Catherine Potel
- e-mail: first_name.surname@univ-lemans.fr ; Tel: 33-2 43 83 36 17 ; Fax: 33-2 43 83 35 20

Web site

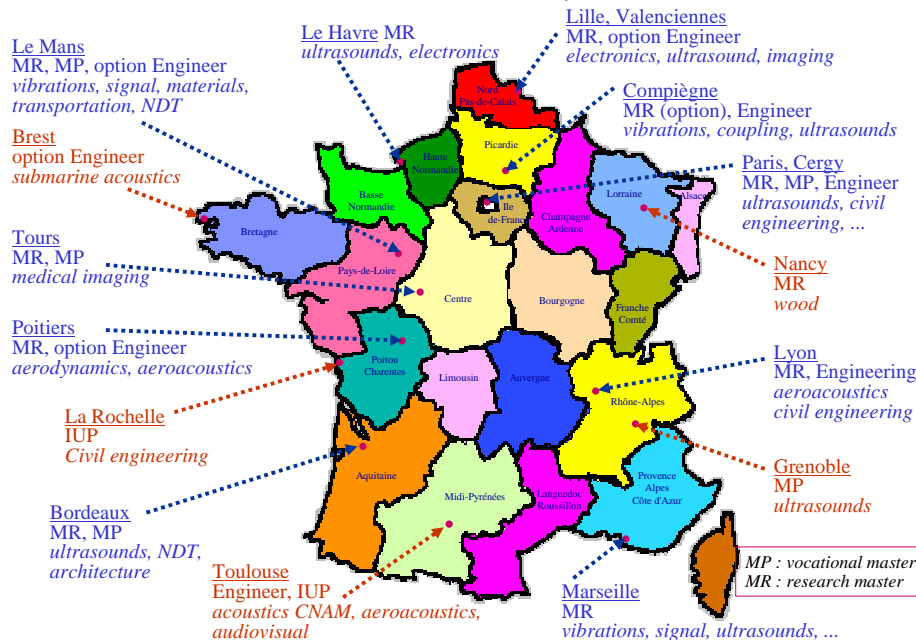
<http://www.univ-lemans.fr/progens/deaacous/>

ACOUSTIC TRAINING IN FRANCE, BACHELOR'S DEGREE



LP : vocational licence

ACOUSTIC TRAINING IN FRANCE, MASTER'S DEGREE



MP : vocational master
MR : research master