Master of IT Research, Brest Campus

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IMT Atlantique is co-accredited, since September 2004, to grant the research master's known as "Mathematics and IT Engineering", specialising in "IT Research", with other institutes:

- the University of Rennes 1 (IFSIC)
- the University of West Brittany (UBO)
- the University of South Brittany (UBS)
- the National Engineering School, Brest (ENIB)
- the National Institute of Applied Science, Rennes (INSA)
- Centrale Supéléc
- Ecole Nationale Supérieure, Cachan (Brittany branch)

The research master's is composed of **core subjects**, a **course of specialisations**, and an "**internship**". The core subjects consist of four modules (five ECTS credits) and a methodological approach to the research module worth five ECTS credits. The specialisation course consists of four modules of five credits. Lastly, the internship is worth 20 credits.

Programme objectives:

The goal is to train students with **diverse IT skills**, who are competent in hardware, software, networks, models and tools, with the specialisation, "Software and Formal Methods". The training course aims to bolster general IT knowledge, ensure a specialisation in a particular IT field and give methodological training for research professions.

This specialisation offers **cutting edge training in modelisation and formal methods**, two rapidly developing areas of research which are remarkably complementary:

- **Modelisation** is a technique which makes it possible to tackle complex issues by focusing on specific aspects. We will study in particular the modelisation of objects, multi-agent systems, documents and programmes.
- **Formal methods** allow for proof of properties and the transformation of programmes. They all have rigorous foundations using semantic, logic or graph theory results.

Both of these areas are in real expansion due to the growing interest of industries in the combined use of these techniques. They are complementary because formal methods can be easily integrated into modelisation techniques and in this way, can strengthen engineering software methods. Conversely, formal techniques are only usable once they have been integrated into a model.

Programme

The **theoretical component** is made up of seven modules of twenty hours, of which four are offered to students in their chosen course of study.

The **practical component** includes a bibliographical study subject to presentation and an internship with a reputed research team.

A **series of lectures** aimed at giving information on areas related to research professions is offered in the PROF module (extra-scientific aspects of professional research).

For more information on the different streams and the programme, go to the IFSIC Rennes1 website for the presentation and the Master of Research programme.

The core subjects of the Breton Master of IT Research

The general knowledge section comprises **four modules** of twenty teaching hours (60 hrs). Students must choose two out of the four, which are broadcast from Rennes via video-conference, and the final one (CMP) is in common with the Brest training course.

The four core modules for the year 2011-2012 broadcast via video-conference at Telecom Bretagne are:

- ADM (Video-conference from Rennes to Brest): Data Analysis and Stochastic Models
- ASR (Video-conference from Rennes to Brest): Introduction to the Algorithmics of Applications and Distributed Systems
- MF (Video-conference from Brest to Rennes): Models and Formalities
- MSM (Video-conference from Rennes to Brest): Mechanised Semantics

Core subjects in Brest:

- CMP (Brest): Knowledge, Models and Paradigms

The list of modules taught is available here.

As well as the four main modules, students may attend three-hour **lectures**, given by local staff members and others.

Methodological approach to research

Methodological training is composed of a bibliographical study, practical work in a research team (an internship), a series of lectures and seminars, and learning oral presentation skills through participating in the master's symposium.

The bibliographical study (BIBL module), indispensable to all research work, is compulsory for all master's students. At the end of the first semester, students hand in a bibliographical study on the topic of their internship. This bibliographical study is evaluated by a reading committee who advise on how the document could be improved. This exercise is organised like the submission of a scientific article.

The Master's Symposium (COLQ Module) gives every student the experience of giving a twenty-minute scientific presentation. The work is organised into three phases: acquiring speaking skills, rehearsals, and actually attending the master's symposium. The content of the presentation is based

on the bibliographical study (BIBL module). The symposium is open to all components of the Matisse doctoral school ("Mathematics, IT, Signals, Electronics and Telecommunications").

A series of lectures (PROF module) must be attended by all students. In this series, different lecturers teach on written and oral scientific communication skills, research professions, the organisation of research and new communication techniques (networks). These lectures may be available on-line.

Information regarding the Bibliography module and lectures is available on the IFSIC website.

Further study in a particular area - the Brest specialisation

The Brest specialisation aims to give future researchers the skills needed for apprehending the core issues of their thesis.

This specialisation consists of:

- Two courses of four modules (see the detailed list here)

*SICH (Human-centred IT Systems), made up of the following modules:
- HUM: humans, their codes, their norms, their societies
- CRV: anthropomorphic behaviours in virtual and augmented reality
- CPU: communities, customs and practices
- LVB: a virtual laboratory for biology

*SOCM (systems and mobile communicating objects):
- MT: models and transformations
- ATF: analysis and formal testing of models
- RSC: environment, networks and control systems
- SIA: architectures for autonomous IT systems

- the internship topic: the Research Master's internship is divided into two periods (the dates are approximate and change each year):
  - October 5 to February 18: students use this period to investigate their topic; they complete their bibliographical study through reading articles, reports or theses as directed by the supervisor and carry out research themselves on other documents not found in the library. This bibliographical study leads to a report (to be handed in on February 18)
  - and a presentation (in the week of March 6-10). From February 1 until the presentation: students are involved in a research project and work full time on achieving the objective of their internship.

Admissions

Conditions for IMT Atlantique engineering students:

Engineering students who have validated the first four semesters of their engineering course may be accepted into the second year of the Research Master's programme. Engineering students file an application; forms are available at the **school office (IG3A-MR)**. The application is examined by the admissions panel of the specialisation chosen. The admission may not be considered definitive until the four semesters have been completely validated and the panel has deliberated. In this case, the student may be simultaneously enrolled in the second year of the master's programme and the third year of the engineering programme.

Conditions for students outside of IMT Atlantique:

Only applications from international students whose original school has signed an agreement with IMT Atlantique or who are part of a common international programme will be considered. Applicants must email a letter of nomination from their university to the International Relations Department: international@telecom-bretagne.eu.

The closing date for filing applications is **June 20, 2017**.

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