Admission

The ideal candidate of the Erasmus Mundus **Master ALGANT** must possess an academic degree from a program in mathematics lasting a minimum of three years (Bachelor). A thorough proficiency in English is required. In fact, every student of the ALGANT master will be offered the possibility to follow his entire curriculum in English. For each student a program will be tailored individually, but every student will have to go through at least two hosting institutions of the ALGANT Consortium. Applicants should:

- have completed a Bachelor of science degree in Mathematics or equivalent, with good results;
- have a thorough proficiency in written and spoken English.

ALGANT master scholarships are available for those interested students that are selected by the ALGANT Commission, meeting the requirements of ALGANT excellence. The amount of the full-study scholarships is variable. It is higher for Third-Country master students (Category A scholarships) than for European master students (Category B scholarships) and can be further reduced (Category C scholarships). ALGANT master applications are paper-free and joint for all categories of applicants (A, B or C).

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Algant Consortium

Université Bordeaux 1 – FR
Chennai Mathematical Institute – IN
Universiteit Leiden – NL
Università degli Studi di Milano - IT
Concordia University/CRM/ISM – CA
Università degli Studi di Padova – IT
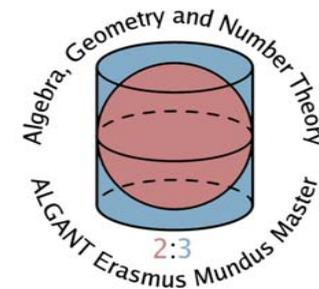Université Paris Sud 11 – FR
Stellenbosch University/AIMS – ZA

http://www.algant.eu

Two-year Master's Program

in

Algebra, Geometry
&
Number Theory

www.algant.eu

ALgebra, **G**eometry **A**nd **N**umber **T**heory

Overview

Traditionally number theory used the methods of algebra and analysis, to solve problems such as finding the number of integral of solutions of equations. In recent times geometric methods have been playing a more important role. Also, number theory has important applications in areas such as cryptography, theoretical computer science, and numerical mathematics. The ALGANT master course aims at introducing students into the latest developments of this fascinating subject.

These new developments led to a unification rather than diversification of number theory. For example, the applications in cryptography are strongly connected to algebraic geometry and computational number theory; algebraic number theory, which used to stand on its own, is now pervading virtually all of number theory; classical objects like zeta functions, introduced with the analytic approach to number theory, have been generalized to become effective tools encoding the number of solutions of Diophantine equations. They have been given a cohomological interpretation, and their study relies heavily on the study of the representations of Galois groups.

These developments have led to the theory of motives. Some of the most striking results obtained in the field are the proof of Weil's conjectures (Dwork, Grothendieck, Deligne), Faltings' proof of Mordell's conjecture, Fontaine's p-adic Hodge theory, Wiles' proof of Fermat's Last Theorem and Lafforgue's result on Langland's Conjecture. As suggested above, great progress has also been achieved in primality tests and factorization methods, and the development of efficient computer algorithms.

Milan Algant Master Courses

Fall Semester Courses	Credits
Commutative Algebra*	9
Number Theory*	9
Complex Varieties*	9
Representation Theory	9
Homological Algebra	6
Category Theory	6
Projective Varieties	6
Algebraic Topology	6

Spring Semester Courses	Credits
Geometry of Schemes*	6
Analytic Number Theory	6
Algebraic Surfaces	6
Numerical Linear Algebra	6
Algant Seminar	3

Courses marked with * are mandatory for first-year students. A specific programme will be included in the *student agreement*. However, to complete their 120 credits students will have to obtain a minimum number of credits in specified kinds of courses, for example:

- ⚥ at least 60 credits of core and advanced courses from algebra, algebraic and analytic number theory and algebraic and differential geometry
- ⚥ at least 30 credits for a research project, prepared under the supervision of an advisor from one of the Consortium's departments leading to the Master Thesis, which has to be defended.

The partner departments offer a compatible basic preparation in the first year (level 1), which then leads to a complementary offer for the more specialized courses in the second year (level 2). Overall the specialized courses cover a very wide spectrum of subjects.

Mobility Schemes

For ALGANT master, Category A, B & C students do have variable (decreasing) duties as follows. All students holding a scholarship and aiming at a (joint or) double degree must spend their study period in at least two of the European partner countries. They all spend their first year in one place. For Category A & B students these two countries must be different from the country in which the scholarship holder has obtained his/her last university degree. Category C students can start the course at any of the partners, including the country in which the scholarship holder has obtained his/her last university degree.

Application

The selection process takes place early enough to allow for notification of final decision at least four months before courses start. Admission is final only when students have obtained the necessary visas, permits and insurance policies (the consortium will help with these procedures). The application deadline for each academic year is published at the Algant website for all categories of applicants. The applicant must register at the relevant application website linked within the Algant website and fill the application, uploading the documents required therein.

Tuition Fees

The tuition fees (per year) are 8 000 Euros for Category A students and 4 000 Euros for Category B & C students. They are paid once a year to the Consortium's Secretariat. For beneficiaries of an Erasmus Mundus scholarship (Category A & B), the tuition fee will be paid by the European Commission.

Milano, January 20, 2012