



Mathematics in Latin America and the Caribbean:

Project Proposals

Commission for Developing Countries,
International Mathematical Union

I. Name of the project:

Central American Regional Doctoral Program in Mathematics

II. Main aim of the project:

Product:

Creation of a regional doctoral program in Mathematics in Central America and Dominican Republic (CA-8), oriented to develop basic and applied research through an intra-regional process broadly participatory and collaborative, and with the support, guidance and advice of the ICTP and its branch in Mesoamerica, MCTP.

Context:

In the (CA-8) region the number of scientists holding a Ph.D. in Mathematics (and other Basic Sciences) is far from reaching a critical mass. Existing doctoral programs are oriented to teaching of mathematics and not to research.

Process:

- Establish a human resource network in mathematics, at doctoral academic level.
- Identification of the installed capacity that exists in the universities of the CA-8 region for supporting teaching-learning and research processes in mathematics.
- Design among the partners of the project of a consensus program, whose title and degree will be recognized by the participating universities.
- Design for each student a personal assessment which will be the basis to prepare his/her program which would enable him/her to successfully develop his/her research project – utilizing regional human resources and installed capacity and the support of ICTP and related institutions.
- Generation of conditions which, once the doctorate is completed, will enable further research in the student's country of origin.
- Improving the assurance of quality teaching of mathematics at the previous academic levels (master's degree, bachelor's degree, and secondary and elementary education).

III. Location of the project:

During the initial three years, the University of Panama and the Technological University of Panama will act as coordinators and administrators.

IV. Target group:

Central American university professors not having a doctoral degree in mathematics.

V. Mathematical Field:

Taking into consideration the installed capacities existing in the region, doctorate-level human resources and the support of the ICTP and MCTP, the doctorate is open to all fields.

VI. Current funding:

Each university that enrolls students in the program will meet the transportation and maintenance costs. The university that receives students will be in charge of registration, administrative costs and the extension of the respective diploma.

VII. Necessary funding:

Grants to cover international stages and the organization of international activities (workshops, seminars) both in and outside the region.

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IX. Description:

The absence of a critical mass of researchers in mathematics, with a doctoral level in the CA-8 (Central America and the Dominican Republic) universities affects the contribution of this discipline to scientific and technological development of the countries and the region as a whole. The investment of the countries of the area in scientific and technological development is insufficient. The establishment of a regional doctorate program in mathematics aims to overcome this situation. The combination of vision and mission of the CSUCA and the ICTP about this situation resulted in the signature of a comprehensive cooperation agreement between the institutions for the creation of a doctoral program in mathematics. Prior to this, a series of consultations and visits to countries and universities were conducted to establish their interest and the capacities (human and installations) to participate.

The initial proposal for the creation of the program was a contribution of Drs. Fernando Quevedo, Galileo Violini and Carlos Ordóñez. It was presented to CSUCA in October 2011. Once the interest of the universities was established, a meeting of experts nominated by the universities was realized in Antigua Guatemala. Its result was a consensual and definitive version of the program and the identification of priority areas for research.

Successive versions of the program have been discussed in meetings of the CSUCA. The program has been approved for its implementation and management, two academic commissions, composed of one representative per country and a coordinating commission have been designated.

The program is scheduled to begin in August 2014 and a meeting of the commissions took place in June at MCTP to finalize applicant's selection and design of programs for each applicant.

The process of consultations has been in charge of Galileo Violini, with a great participation in the discussions of Fernando Quevedo, Carlos Ordóñez, Arnulfo Zepeda and Juan Alfonso Fuentes.

I. Name of the project:

Escuela Matemática de América Latina y el Caribe (EMALCA)

II. Main aim of the project:

Product:

- EMALCA Mathematics Schools in Latin American countries with low local support, oriented to improve local development of mathematics and mathematical education.
- Increase the number of schools.
- Expand the program possibly including courses aimed to improve the mathematical level of secondary school teachers.

Context:

In the Latin American region the number of scientists holding a Ph.D. in Mathematics is far from reaching a critical mass. Moreover, the geographical distribution of Universities with Ph.D. programs is not the best, so there are countries and even regions inside more developed countries which remain isolated from mathematical activity. Students from these regions suffer from this situation.

Process:

- Identification of the installed capacity that exists in the universities of the region for supporting teaching-learning processes in Mathematics
- Choose among the partners of the project of a list of universities that will be the local hosts for EMALCAs.
- Select a team that will prepare projects for these schools.
- Design organizing teams.

III. Location of the project:

Less developed regions in Latin America.

IV. Target group:

Latin American University professors and students isolated from mathematical activity in the region.

V. Mathematical Field:

Taking into consideration the installed capacities existing in the region, this program is open to all fields

VI. Current funding:

These schools are funded mainly by the International Center of Pure and Applied mathematics (CIMPA) and by institutions in the countries where they are held. CIMPA covers approximately 30% of the budget of each school, which means 3500 euros.

VII. Necessary funding:

Grants to cover the organization of these activities: tickets and living expenses of professors and students from nearby regions. Support from the IMU for this program would be invaluable to increase its effects not only in the future development of mathematics in Latin America but also in improving performance of educational systems.

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IX. Description:

One of the main activities of UMALCA is the program of Mathematics Schools called Escuela Matemática de América Latina y el Caribe (EMALCA). Each school consists of several courses on different topics of mathematics offered to students of mathematics at the university level. The program was initiated in 2001 based on schools that had been organized in Venezuela and Mexico. The initial aim of the program was to help the development of mathematics in Central America through the participation of students from this region in the Mexican and Venezuelan schools. Shortly after its start the program was extended to schools in other countries, mainly in the less developed regions, provided some local funds were available.

EMALCAs have been organized since 2001, altogether 45 schools, in 16 countries:

México, Venezuela, Costa Rica, Paraguay, Bolivia, Colombia, Nicaragua, Peru, Cuba, Brazil, Guatemala, Ecuador, Argentina 2012: Costa Rica, Honduras, Panama.

The number of participants in each school varies from country to country. While in Brazil, Mexico and Venezuela schools usually have over a hundred participants, in other countries this number is around thirty to fifty.

EMAs schools in Africa (organized by the African Mathematical Union) and SEAMSS schools (organized by the South-East Asia Mathematical Society), have been deeply inspired by EMALCAs. These schools also have partial CIMPA funding.

UMALCA's concern for improving the teaching of mathematics in basic and secondary levels of the educational systems is being considered to use this format of schools to contribute to the improvement of the professional level of teachers, for example including courses or organizing schools aimed to secondary school teachers of the region.

EMALCAs help putting young people in contact with relevant topics of current interest and stimulating those who excel among them. They motivate some to continue higher education.

The internal process for selecting UMALCA EMALCAs is clear. A committee receives proposals, and works with the organizers to complete the project if necessary. Those proposals approved receive funding. The committee informs about the results to the Assembly of UMALCA. This committee is appointed by UMALCA's Assembly and is a reflection of the Latin American mathematical community.

I. Name of the project:

Central America and Caribbean Math Olympiad OMCC

II. Main aim of the project:

Organize and celebrate the Central America and Caribbean Math Olympiad (OMCC) in a country of the region. The main objective of the OMCC is to identify and support talented students in mathematics and allow them to reach its maximum mathematical potential to support the development of science and technology in the participating countries.

III. Location of the project:

Puerto Rico Mathematical Olympiads Program
Mathematical Sciences Department
University of Puerto Rico at Mayaguez

IV. Target group:

High school students younger than 16 years old from the thirteen participant countries: Venezuela, Colombia, Panama, Costa Rica, Honduras, Guatemala, El Salvador, Nicaragua, Mexico, Cuba, Dominican Republic, Puerto Rico and Jamaica.

V. Mathematical Field:

Mathematics Problems from Math Olympiads which include: combinatorics, number theory, geometry, algebra and games and strategies.

VI. Current funding (if any):

Each organizing country looks for the budget within the government and national sponsors.

VII. Necessary funding:

120.000 US\$ per year.

VIII. Contact person:

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IX. Description:

The OMCC is a Mathematical Olympiad contest for high school students younger than 16 years old from countries in the Central American and Caribbean region. This activity is celebrated each year in a different country of the region. One of the main goals of the OMCC is to promote the interest in mathematics and to help the development of science and technology.

Math Olympiads are a proven strategy to identify and support talented students in mathematics and to help them reach their maximal mathematical potential. Many countries that have solid math Olympiad programs have benefited from their group of ex-Olympian students to increase their critical mass of scientists and mathematicians.

The OMCC has been organized yearly since 1999. In every OMCC thirteen countries take part, represented by a delegation of three students and two teachers: a leader and a deputy leader. It is organized with the same structure than the International Mathematical Olympiad (IMO). At this moment, the countries which are invited every year to the OMCC are: Colombia, Costa Rica, Cuba, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Dominican Republic, Puerto Rico and Venezuela. To be able to keep this activity alive, we need support from an umbrella organization which allows us to guarantee the continuity of this event.

Mathematical Olympiads encourage the study of this discipline at an advanced level. This helps greatly to promote mathematics in the countries that host events of this nature. One of the primary objectives of this project is to organize the OMCC in underdeveloped countries in the region, some of which have never been hosts due to lack of academic and economic support.

This event has been a great impact on the region. However, due to little support in some countries, each year it is difficult to get a venue country due to economic problems.

An example of the success of the OMCC is that in 2010 Jamaica was invited for the first time to participate. Until then Jamaica did not have a Mathematical Olympiad in their educational system. In order to participate in 2010, they organized a national Olympiad to select the team that would represent them. Today, coordinated by the West Indies University, Jamaica has a cycle of national Olympiads which involves thousands of students in the island. Their mathematical level has increased tremendously and in the XVI OMCC this summer 2014 they got their first bronze medal, and they also won the Copa El Salvador, a prize given to the country which shows a major advance in its performance during two consecutive years.

On the other hand, with economic support we could invite to the OMCC some other countries of the region such as Barbados, Trinidad and Tobago, Virgin Islands, among others and this would help their educational system and would integrate them more to the international mathematical community.