

International Mathematics Competition for University Students (IMC)

1994 to 2014

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Structure of the IMC



The International Mathematics Competition for University Students (IMC) is an annual mathematics competition open to all undergraduate students of mathematics, and is aimed at students just finishing their first, second, third or fourth year of university education. Each year we do, however, have a few participants that have not yet started university or who have just finished their fifth year at university. An impressively large number of the participants have been former **IMO** medal winners, some multiple medal winners, during their school years prior to university.

The competition is held each year at the end of July or beginning of August. The **IMC** is primarily a competition for individuals, although most participating universities select and send one or more teams of students of approximately four student per team, plus one or more Team Leaders. Students coming on their own, or in a group without a Team Leader, are welcome and encouraged to participate. We provide a Team Leader to those students who do not have one, who will argue on their behalf when marking has been completed, should they disagree with the number of points that they have received for particular solutions.

The competition runs over five or six days during which the competitors sit two five-hour examinations, each with five questions (six until 2008) chosen by a panel and the Team Leaders from the participating universities. Problems are from the fields of Algebra, Analysis (Real and Complex), Combinatorics and Geometry. The working

language is English. Efforts are made to make accessibility as wide as possible; the costs of the **IMC** have been subsidized by a number of different sponsors over the years, some of whom have recruited participants for summer internships while at university and jobs after completing university, and prizes have been provided by some sponsors. Students from over 200 universities from 51 countries have participated over the first twenty competitions. Here is a list of the countries that have had students participate to date: Angola, Armenia, Austria, Azerbaijan, Barbados, Belarus, Belgium, Brazil, Bulgaria, Colombia, Croatia, Cyprus, Czech Republic, England, Estonia, Finland, France, Germany, Greece, Hungary, Indonesia, Iran, Ireland, Israel, Italy, Kazakhstan, Lithuania, Macedonia, Mexico, Moldova, Mongolia, Netherlands, Nigeria, Norway, Poland, Republic of Korea, Romania, Russia, Serbia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Switzerland, Turkmenistan, Ukraine, United States of America, Uzbekistan, Vietnam.

IMC Jury

At each IMC the Team Leaders comprise the competition Jury. They propose problems before the **IMC**. They democratically select the ten problems to be used in the competition after length discussions. They divide up into teams to mark the work of the students each of the two problem days, working well into the night each of those days. On the final day before the closing award ceremony they finalize the results and correct errors or inconsistencies in the marking. This transparent, democratic and congenial participation of the Team Leaders is an important element of the **IMC**.

IMC Sponsors

At various times over the past twenty years the IMC has had sponsorships from the following: Citibank, Goldman-Sachs, UBS Financial Group, D E Shaw & Co., Princeton University Press, Cambridge University Press, Springer-Verlag UK, Wolfram Research, the EU Tempus Program, and the British Council. We are continually open to new sponsors wishing to promote their brand, or to recruit highly talented young mathematicians.

Aims of the IMC

The **IMC** aims to provide a friendly, comfortable and secure environment for university mathematics students to enjoy mathematics with their peers from all around the world, to broaden their world perspective and to be inspired to set mathematical goals for themselves that might not have been previously imaginable or thought possible.

Unlike the **IMO**, the **IMC** is university based rather than country based. Most students represent their universities with many being preselected and their expenses paid by their university, although some students come on their own without any university support, showing the type of independent initiative so important for success in life. The atmosphere is casual and relaxed, although a keen competitive atmosphere is maintained. Students mix freely and frequently with participants from other universities and other countries. Some share rooms with participants from other countries. The **IMC** encourages the fostering of friendships that bridge the ethnic, cultural, political and religious divides in the world today. Friendships forged at the **IMCs** can be expected to last a lifetime.

Excursions and other activities

Each year one or two excursions are organized for the participants. From Blagoevgrad the Rila Monastery is an interesting excursion destination, providing a look into the history of Bulgaria with an interesting journey into the Rila Mountains. The Rila Monastery is the largest and most famous Eastern Orthodox monastery in Bulgaria, being founded in the 10th century. The oldest buildings date from the first half of the 14th century. The monastery complex, regarded as one of the foremost masterpieces of Bulgarian National Revival architecture, was declared a national historical monument in 1976 and became a UNESCO World Heritage Site in 1983. Since 1991 it has been entirely subordinate to the Holy Synod of the Bulgarian Orthodox Church.

The participants spontaneously organize other social activities; for example a football tournament, organized by the Brazilians, and a barbecue with sangria, organized by the Spanish.

Benefits for the students

1. As global communication steadily increases and the world, at least of mathematics, becomes more homogeneous, the **IMC** offers a stepping-stone for its young participants into the international world of mathematics, and to the myriad of exciting possibilities that await them.
2. Winning a Prize at the **IMC** is commonly added to CVs when students apply to PhD programs around the world. Past participants have gone on to become today's Team Leaders, and some to become Professors of Mathematics in some of the leading universities around the world.
3. The **IMC** provides an unparalleled opportunity to learn about university mathematics education, customs and attitudes of students from many different countries in the world. Acquaintances can be made and friendships formed with fellow mathematics students from Eastern and Western Europe, Asia, the Middle East, North and South America and Africa.

Honour System

Unlike the **IMO**, the Team Leaders stay in the same Hall of Residence as the students. We promote an honor system emphasizing that it is simply childish and in no one's interests for anyone to gain an unfair advantage by cheating in the competition. The students have shown admirable cooperation and respect for this attitude. The possibility of cheating is, as in the **IMO**, something that has to be dealt with calmly, openly and firmly. Over the past twenty years we have had three incidences of cheating. In all three cases, as unpleasant as it was for us, the entire team was disqualified. We do monitor the examinations rooms, and inspect the solutions with some care for indications of cheating.

Organization of the IMC

University College London has been involved in the organization of the **IMC** and Prof J E Jayne has served as the President from the **1st IMC** in 1994. The **IMC** began modestly in 1994 in Plovdiv, Bulgaria, with 49 participants, mostly from Bulgaria, under the initiative of the Faculty of Mathematics of Sofia University. The 2nd, 3rd and 4th **IMCs** were also held in Plovdiv. From 1996 to 1999 the **IMC** was one of the activities of the Structural Joint European Tempus Project #S_JEP-11087-96, entitled "Modular Education in Mathematics and Informatics", which was the flagship EU

Tempus Project in Bulgaria at the time, aimed at bringing Bulgaria's university mathematics and computing degree programs into line with those in the European Union in preparation for Bulgaria's entry into the EU. University College London was the Contractor for this EU Tempus Project and Prof J E Jayne was the Coordinator of the Project. In 1998 the **5th IMC** was moved to Blagoevgrad, Bulgaria, benefiting from the excellent administrative support and facilities of both the South-West University "Neofit Rilski" in Blagoevgrad and the American University in Bulgaria. The **5th IMC** had 80 participants from 9 countries.

The **6th IMC** was held on Lake Balaton in Keszthely, Hungary; the 7th in London, the 8th in Prague, the 9th in Warsaw, the 10th in Cluj-Napoca, Romania, the 11th in Skopje, Macedonia, the 12th in Blagoevgrad, the 13th in Odessa, the 14th and 15th in Blagoevgrad, and the 16th in Budapest. In 2009 the **16th IMC** had 347 participants and 65 teams. Since 2009 the **IMC** has been held at the American University in Bulgaria, in Blagoevgrad, with the additional assistance from the South-West University "Neofit Rilski" in Blagoevgrad.

Blagoevgrad is a pleasant university town, one of the nicest in Bulgaria, where the American University in Bulgaria economically provides modern Halls of Residence, excellent dining facilities, and the large examination halls required by the **IMC**. The growth of the **IMC** has increased the administrative complexity, and the experienced support that the **IMC** receives in Blagoevgrad is invaluable.

IMC web site

The **IMC** website is at <http://www.imc-math.org.uk>, where all of the problems and solutions from the past twenty years may be found, along with the results, photos and other information.

Recent IMC grand first prize winners

20th IMC had three Grand First Prize Winners

- 1 Vladimir Bragin, Lomonosow Moscow State University
- 2 Pavlo Mishchenko, Moscow Institute of Physics and Technology
- 3 Szymon Kanonowicz, Warsaw University

19th IMC had one Grand First Prize Winner

Danylo Radchenko, Kyiv Taras Shevchenko National University

18th IMC had one Grand Grand First Prize and five Grand First Prize Winners

Grand Grand First Prize

Przemysław Mazur, Jagiellonian University

Grand First Prize

1 László Lovász, Eötvös Loránd University

2 Adam Hesterberg, Princeton University

3 Alexey Gladkikh, Tel-Aviv University

4 Danylo Radchenko, Kyiv Taras Shevchenko National University

5 Vladislav Volkov, Saint Petersburg State University

17th IMC had one Grand Grand First Prize and three Grand First Prize Winners

Grand Grand First Prize

Przemysław Mazur, Jagiellonian University

Grand First Prize

1 Ivan Feshchenko, Kyiv Taras Shevchenko National University

2 Danylo Radchenko, Kyiv Taras Shevchenko National University

3 Dan Carmon, Tel Aviv University

16th IMC had two Grand First Prize Winners

1 Alexander Efimov, Moscow State University

2 Jakub Konieczny, Jagiellonian University

Acknowledgements

The **IMC** could not have experienced the success that it has without the dedicated hard work year after year for the past 10 to 15 years of many individuals, especially Géza and Rita Kós, Michał Krych, Masha Vlasenko, Anton Millet, Tamas Keleti, Dmytro Mitin, Marjan Jerman, Djordje Milicevic, among many others. Chrisina Jayne has served as the IMC Coordinator from the **5th IMC** to present. The enthusiastic

support from the many Team Leaders and the several thousand students, some of whom participated several times, has made the **IMC** the special event that it has become.

Past IMCs

- *The 1st IMC was held in Plovdiv, Bulgaria on 28 July-2 August 1994.
- *The 2nd IMC was held in Plovdiv, Bulgaria on 26-7 August 1995.
- *The 3rd IMC was held in Plovdiv, Bulgaria on 31 July-5 August 1996.
- *The 4th IMC was held in Plovdiv, Bulgaria on 30 July-4 August 1997.
- *The 5th IMC was held in Blagoevgrad, Bulgaria on 29 July-3 August 1998.
- *The 6th IMC was held in Keszthely, Hungary on 29 July-2 August 1999.
- *The 7th IMC was held in London, England on 26-31 July 2000.
- *The 8th IMC was held in Prague, Czech Republic on 19-25 July 2001.
- *The 9th IMC was held in Warsaw, Poland on 19-25 July 2002.
- *The 10th IMC was held in Cluj-Napoca, Romania on 25-31 July 2003.
- *The 11th IMC was held in Skopje, Republic of Macedonia on 23-29 July 2004.
- *The 12th IMC was held in Blagoevgrad, Bulgaria on 22-28 July 2005.
- *The 13th IMC was held in Odessa, Ukraine on 20-26 July 2006.
- *The 14th IMC was held in Blagoevgrad, Bulgaria on 3-9 August 2007.
- *The 15th IMC was held in Blagoevgrad, Bulgaria on 25-31 July 2008.
- *The 16th IMC was held in Budapest, Hungary on 25-30 July 2009.
- *The 17th IMC was held in Blagoevgrad, Bulgaria on 24-30 July 2010.
- *The 18th IMC was held in Blagoevgrad, Bulgaria on 28 July-3 August 2011.
- *The 19th IMC was held in Blagoevgrad, Bulgaria on 26 July-1 August 2012.
- *The 20th IMC was held in Blagoevgrad, Bulgaria on 6-12 August 2013.

Current IMC

- *The 21st IMC will be held in Blagoevgrad, Bulgaria on 29 July-4 August 2014.