International Mathematical Union

February 29, 2012
IMU AO Circular Letter 2/2012

To: IMU Adhering Organizations
Mathematical Societies

From: Martin Grötschel, IMU Secretary

Nomination of invited plenary and sectional speakers for ICM 2014

The Program Committee for the International Congress of Mathematicians 2014 in Seoul, Republic of Korea, August 13-21, 2014 has been set up. According to the PC/OC Guidelines the Program Committee has chosen the core panels for the ICM 2014 sections. At this moment in time the Adhering Organizations of IMU and the mathematical societies the world over are invited to nominate invited plenary and sectional speakers.

Attached to this circular letter please find the list of the ICM 2014 sections. When you make nominations for speakers please specify whether you suggest them as plenary speakers or section speakers. In case of proposals of section speakers please indicate to which sections you would like the persons to be invited.

All communication concerning the scientific program of ICM 2014 is handled by the Chair of the Program Committee. Please direct all your mail with proposals for invited plenary and sectional speakers to Prof. Carlos Kenig, the Louis Block Distinguished Service Professor of the University of Chicago, and please use the special e-mail address for this purpose
PC-Chair-ICM2014@mathunion.org.

Sincerely

Martin Grötschel
IMU Secretary

Encl.

Attachment to IMU AO Circular Letter 2/2012 of February 29, 2012

ICM 2014 section descriptions as well as the number of lectures to be given in each section

1. Logic and Foundations (3-5 lectures)

Model theory. Set theory. Recursion theory. Proof theory. Applications.
Connections with sections 2, 3, 13, 14.

2. Algebra (4-6 lectures)

Groups (finite, infinite, algebraic) and their representations. Rings, Algebras and Modules (except as specified in other sections, Geometry, or Lie theory). Algebraic K-theory, Category theory, Computational aspect of algebra and applications.
Connections with sections 1, 3, 4, 5, 6, 7, 13, 14.

3. Number Theory (9-12 lectures)

Analytic and algebraic number theory. Local and global fields and their Galois groups. Zeta and L-functions. Diophantine equations. Arithmetic on algebraic varieties. Diophantine approximation, transcendental number theory, and geometry of numbers. Modular and automorphic forms, modular curves, and Shimura varieties. Langlands program. p-adic analysis. Number theory and physics. Computational number theory and applications, notably to cryptography.
Connections with sections 1, 2, 4, 7, 11, 12, 13, 14.

4. Algebraic and Complex Geometry (9-12 lectures)

Algebraic varieties, their cycles, cohomologies, and motives. Schemes. Geometric aspects of commutative algebra. Arithmetic geometry. Rational points. Low-dimensional varieties. Singularities and classification. Birational geometry. Moduli spaces and enumerative geometry. Derived categories. Abelian varieties. Transcendental methods, topology of algebraic varieties. Complex differential geometry, Kähler manifolds and Hodge theory. Relations with mathematical physics and representation theory. Real algebraic and analytic sets. Rigid and p-adic analytic spaces. Tropical geometry. Non-commutative geometry.
Connections with sections 2, 3, 5, 6, 7, 8, 11, 13, 14.

5. Geometry (10-13 lectures)

Local and global differential geometry. Non-linear and fully non-linear geometric PDE. Geometric flows. Geometric structures on manifolds. Riemannian and metric geometry. Geometric aspects of group theory. Conformal geometry, Kähler geometry, Symplectic and Contact geometry, Geometric rigidity, General Relativity.
Connections with sections 2, 4, 6, 7, 8, 9, 10, 11, 12, 16, 17.

6. Topology (9-11 lectures)

Algebraic Topology, Differential Topology, Geometric Topology, Floer and gauge theories, Low-dimensional manifolds including knot theory and connections with Kleinian groups and Teichmuller theory, Symplectic Geometry and contact manifolds, and Topological quantum field theories.
Connections with sections 2, 4, 5, 7, 8, 11.

7. Lie Theory and Generalizations (8-10 lectures)

Algebraic and arithmetic groups. Structure, geometry, and representations of Lie groups and Lie algebras. Related geometric and algebraic objects, e.g. symmetric spaces, buildings, vertex operator algebras, quantum groups. Non-commutative harmonic analysis. Geometric methods in representation theory. Discrete subgroups of Lie groups. Lie groups and dynamics, including applications to number theory.

Connections with sections 2, 3, 4, 5, 6, 8, 9, 11, 12, 13.

8. Analysis and its Applications (9-12 lectures)

Classical analysis. Real and Complex analysis in one and several variables, potential theory, quasiconformal mappings. Harmonic analysis. Linear and non-linear functional analysis, operator algebras, Banach algebras, Banach spaces. Non-commutative geometry, spectra of random matrices. Asymptotic geometric analysis. Metric geometry and applications. Geometric measure theory.

Connections with sections 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16.

9. Dynamical Systems and Ordinary Differential Equations (9-12 lectures)

Topological and symbolic dynamics. Geometric and qualitative theory of ODE and smooth dynamical systems, bifurcations and singularities. Hamiltonian systems and dynamical systems of geometric origin. One-dimensional and holomorphic dynamics. Strange attractors and chaotic dynamics. Multidimensional actions and rigidity in dynamics. Ergodic theory including applications to combinatorics and combinatorial number theory. Infinite dimensional dynamical systems and PDE.

Connections with sections 5, 7, 8, 10, 11, 12, 13, 15, 16.

10. Partial Differential Equations (9-12 lectures)

Solvability, regularity, stability and other qualitative properties of linear and non-linear equations and systems. Asymptotics. Spectral theory, scattering, inverse problems. Variational methods and calculus of variations. Geometric Evolution equations. Optimal transportation. Homogenization and multiscale problems. Relations to continuous media and control. Modeling through PDEs.

Connections with sections 5, 8, 9, 11, 12, 15, 16, 17.

11. Mathematical Physics (9-12 lectures)

Quantum mechanics. Quantum field theory including gauge theories. General relativity. Statistical mechanics and random media. Integrable systems. Supersymmetric theories. String theory. Fluid dynamics.

Connections with sections 4, 5, 6, 7, 8, 9, 10, 12.

12. Probability and Statistics (10-13 lectures)

Stochastic processes, Interacting particle systems, Random media, Random matrices, conformally invariant models, Stochastic networks, Stochastic geometry, Statistical inference, High-dimensional data analysis, Spatial methods.

Connections with sections 3, 5, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17.

13. Combinatorics (8-10 lectures)

Combinatorial structures. Enumeration: exact and asymptotic. Graph theory. Probabilistic and extremal combinatorics. Designs and finite geometries. Relations with linear algebra, representation theory and commutative algebra. Topological and analytical techniques in combinatorics. Combinatorial geometry. Combinatorial number theory. Additive combinatorics. Polyhedral combinatorics and combinatorial optimization.

Connections with sections 1, 2, 3, 4, 7, 9, 12, 14.

14. Mathematical Aspects of Computer Science (6-8 lectures)

Complexity theory and design and analysis of algorithms. Formal languages. Computational learning. Algorithmic game theory. Cryptography. Coding theory. Semantics and verification of programs. Symbolic computation. Quantum computing. Computational geometry, computer vision.

Connections with sections 1, 2, 3, 4, 12, 13, 15.

15. Numerical Analysis and Scientific Computing (5-7 lectures)

Design of numerical algorithms and analysis of their accuracy, stability, and complexity. Approximation theory. Applied and computational aspects of harmonic analysis. Numerical solution of algebraic, functional, stochastic, differential, and integral equations. Grid generation and adaptivity.

Connections with sections 8, 9, 10, 12, 14, 16, 17.

16. Control Theory and Optimization (5-7 lectures)

Minimization problems. Controllability, observability, stability. Robotics. Stochastic systems and control. Optimal control. Optimal design, shape design. Linear, non-linear, integer, and stochastic programming. Applications.

Connections with sections 9, 10, 12, 15, 17.

17. Mathematics in Science and Technology (8-10 lectures)

Mathematics applied to the physical sciences, engineering sciences, life sciences, social and economic sciences, and technology. Bioinformatics. Mathematics in interdisciplinary research. The interplay of mathematical modeling, mathematical analysis, and scientific computation, and its impact on the understanding of scientific phenomena and on the solution of real life problems.

Connections with sections 9, 10, 11, 12, 14, 15, 16.

18. Mathematics Education and Popularization of Mathematics
(2 lectures plus 3 panel discussions)

All aspects of mathematics education, from elementary school to higher education. Mathematical literacy and popularization of mathematics.

19. History of Mathematics (3 lectures)

Historical studies of all of the mathematical sciences in all periods and cultural settings.