REPORT ON LMS-EPSRC SHORT INSTRUCTIONAL COURSE
SYMPLECTIC GEOMETRY
INSTITUTE OF MATHEMATICS, ABERDEEN UNIVERSITY
JULY 10 - JULY 15, 2011

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The short course took part at the Institute of Mathematics, University of Aberdeen, July 11-15, 2011. It attracted about 30 people. The participants were mainly post-graduate students but there were also MSc students as well as post-docs and working academics. Although the majority of them was based at the UK universities, there was a substantial amount from the EU (France, Italy, Sweden, Switzerland) and also a participant from Canada. Their knowledge of the subject was diverse as well. There were people with a reasonable background in symplectic geometry as well as participants working in completely different areas who wanted to enhance their expertise.

The course aimed at attracting participants working in various areas of mathematics and provide them with the basic knowledge of the contemporary techniques of symplectic geometry. The special emphasis was put on the interplay of various branches of mathematics (topology, analysis, geometry, algebra, group theory). According to informal conversations with participants and the questionnaire provided the aims were successfully achieved.

There were three series of lectures (three hours every day before lunch with a tea/coffee break):

(1) **Examples of symplectic manifolds and group actions, by Jarek Kędra (Aberdeen)**. The course started with the background information and necessary definitions. Various constructions of symplectic manifolds and group actions on them were presented. The series finished with the proof of Delzant's theorem about symplectic actions of Lie groups.

(2) **Floer Homology, by Alexandru Oancea (Strasbourg)**. The course consisted of lectures on: Morse theory; Floer homology; the Floer equation as the gradient line equation; the Floer equation as the perturbed Cauchy-Riemann equation.

(3) **Gromov–Witten Theory, by Tom Coates (Imperial College London)**. This series consisted of: Pseudoholomorphic Curves in Symplectic Manifolds; Moduli spaces of stable maps; Quantum Cohomology; Associativity and the WDVV Equations; A Word About Mirror Symmetry.

The lecture series were completed with 'catching-up classes'. These were afternoon classes (two hours every day except Wednesday finishing with a tea/coffee break) devoted to solving problems, providing more details on the material presented in the morning sessions and answering the participant's questions. Finally, there were three special lectures in late afternoons:

(1) Gabriel Paternain (Cambridge) - The contact geometry of the restricted 3-body problem;

(2) Paul Biran (Zurich) - Lagrangian topology from the geometric and categorical viewpoints;

(3) Ivan Smith (Cambridge) - Homological algebra of symplectic topology.

The course has a website `http://www.maths.abdn.ac.uk/~kedra/lms/` with lecture notes and other useful information.

The participant were staying at the Royal Hotel in the centre of Aberdeen which was a half an hour walk from the Institute of Mathematics. The breakfasts and evening meals were provided by the hotel. The participants had lunches at the university campus. The reception took place a Howie's Restaurant with a range of traditional Scottish food. The Wednesday afternoon was free.

The participants had an opportunity to submit a feedback in the form of a questionaire. The expectations of the majority of them (more than 80%) have been met and the same number of participants found the course helpful for their Phd's. Almost all the participnats found the lecturers very approachable and they found the number and level of problems accurately chosen.

None of the participants provided a negative comment.

Participants:

Lecturers:

(1) Tom Coates (Imperial College London)

(2) Jarek Kędra (Aberdeen)

(3) Alexandru Oancea (Strasbourg)

Guest speakers:

(1) Paul Biran (Zurich)

(2) Gabriel Paternain (Cambridge)

(3) Ivan Smith (Cambridge)

EPSRC funded participants:

(1) Tarig Abdelgadir, University of Glasgow (EPSRC)

(2) Robert Friswell, University of York (EPSRC)

(3) Ewan Morrison, University of Glasgow (EPSRC)

(4) Sophie Norman, University of Glasgow (EPSRC)

(5) Yu Qiu, University of Bath (EPSRC)

(6) Andrew Strangeway, Imperial College (EPSRC)

(7) Benjamin Volk, University of Oxford (EPSRC)

(8) James Waldron, University of York (EPSRC)

UK based students but not funded by the EPSRC:

(1) Ayse Borat, University of Aberdeen

(2) David Dowell, Sheffield University

(3) Ana Lucia Garcia Pulido, University of Warwick

(4) Simon Pelling, King's College London

(5) Oldrich Spacil, University of Aberdeen

UK post-docs and academics:

(1) William Holderbaum, University of Reading (academic)

(2) Yashar Memarian, University College London (post-doc)

(3) Daniele Sepe, University of Leicester (post-doc)

(4) Rafael Torres, Oxford University (post-doc)

Overseas based participants:

(1) Davide Barilari, SISSA-ISAS, Trieste, Italy

(2) Cedric Bounya, Irma, Strasbourg, France

(3) Francois Charette, University of Montreal, Canada

(4) Jean Gutt, University of Strasbourg, France

(5) Ramon Horvath, Uppsala University, Sweden

(6) Nassima Keddari, University of Strasbourg, France

(7) Antonio Lerario, Sissa - Isas Trieste, Italy

(8) Filip Misev, University of Basel, Switzerland (MSc student)

(9) Romain Ponchon, University of Strasbourg, France

(10) Stefano Romano, Sissa Trieste, Italy