

GENERAL REPORT

XI Modelling Week at the Complutense University of Madrid (June 19-June 23, 2017)

http://www.mat.ucm.es/congresos/mweek/XI_Modelling_Week/index.htm

The UCM XI Modelling Week (MW) has been organized within the Master Program in Engineering Mathematics of the School of Mathematics at the Complutense University of Madrid in cooperation with the Institute of Interdisciplinary Mathematics (IMI). It has been sponsored by MI-NET Mathematic for Industry Network. The main purpose of the XI MW was to promote the use of mathematical methods and models in research, industry, innovation, and management in the knowledge economy.

The UCM XI MW was open to the students of the Master in Mathematical Engineering at UCM, as well as to participants from other mathematically oriented master programs worldwide. Besides local students, students from Universities of Oxford (UK), Leicester (UK), Florence (Italy), and Munich (Germany) participated in the MW. Students worked in 6 groups (6-7 persons per group) on real industrial problems proposed by companies and research groups under supervision of one or two qualified instructors. Totally we hosted 41 students and 10 instructors.

Problems proposed (available at the MW web)

Six different problems has been analyzed:

1. **Modeling species transport through membrane in haemodialysis.** Proposed by: University of Oxford, United Kingdom. Coordinator: Sourav Mondal (University of Oxford, UK).
2. **Existence of time compaction in the human brain: Theoretical and experimental study.** Proposed by: Institute of Interdisciplinary Mathematics, Spain. Coordinators: José Antonio Villacorta Atienza and Carlos Calvo (Universidad Complutense de Madrid, Spain).
3. **Mathematical modelling of charge transport in a semiconductor.** Proposed by: University of Florence, Italy. Coordinator: Luigi Barletti (University of Florence, Italy).
4. **Real-time face recognition in live video streams.** Proposed by: ARM, United Kingdom. Coordinator: Ivan Tyukin (University of Leicester, United Kingdom).
5. **Option management with discontinuities in the payoff: Distribution of probability of losses.** Proposed by: Banco Popular, Spain. Coordinators: Elena Castilla, Juan Antonio Infante Del Rio, and Gerardo Oleaga (Universidad Complutense de Madrid, Spain).
6. **Water quality management and control of pollution in lakes.** Proposed by: INRA and Vendée Eau, France. Coordinator: María Crespo (University of Montpellier, France).

Schedule

The MW was split into three parts:

- **Monday, June 19 [16:00h–18:30h]:** OPENING SESSION and PRESENTATION OF THE PROBLEMS by coordinators and companies representatives.



Opening session. Left to right: A. Díaz-Cano (dean of the School of Mathematics), V. Makarov (director of the UCM XI Modelling Week,) and Á.M. Ramos (director of the Institute of Interdisciplinary Mathematics). The sponsor slide is exhibited and acknowledged by V. Makarov

- **Monday, June 19 [18:30h-20:30h], Tuesday, June 20 [9:00-14:00h & 16:00h-20:30h], Wednesday, June 21 [16:00h-20:30h], Thursday, June 22 [9:00-14:00h & 16:00h-20:30h], and Friday, June 23 [9:00h-14:00h & 16:00h-17:00h]:** WORKING IN GROUPS. Each group of students, coordinated by one or various experts, works on a problem.



Working in groups. Seven students of group 5 work together to obtain a solution of the proposed problem.

- **Friday, June 23 [17:00h–20:00h]: PRESENTATION OF RESULTS AND CONCLUSIONS.** Each group delivered a report describing the results and conclusions reached and explain them in a public presentation.



Exposition of the main results obtained by Group 2. The seven students participating in this group contribute to final presentation (all students took part in the presentation).

Final Photo (evening June 23)



All participants of the UCM XI Modelling Week, in a Final Photo.

Final Reports

Once the event has been over, students had time to write final reports (deadline, July 5), setting out the results and conclusions reached. All reports are available on the event website (under Problems in the left menu).

Collaborators

The UCM XI Modelling Week has been kindly sponsored by:

THE MATHEMATICS FOR INDUSTRY NETWORK (MI-NET)



FACULTY OF MATHEMATICS, UNIVERSIDAD COMPLUTENSE DE MADRID



INSTITUTE OF INTERDISCIPLINARY MATHEMATICS



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July 7, 2017

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