



# *The Hebrew University of Jerusalem*

## *Syllabus*

### *Advanced topics in Geometry - 80671*

*Last update 28-10-2024*

*HU Credits:* 4

*Degree/Cycle:* 2nd degree (Master)

*Responsible Department:* Mathematics

*Academic year:* 2025

*Semester:* 1st Semester

*Teaching Languages:* English

*Campus:* E. Safra

*Course/Module Coordinator:* Dr. Yoel Groman

*Coordinator Email:* [ygroman@gmail.com](mailto:ygroman@gmail.com)

*Coordinator Office Hours:*

*Teaching Staff:*

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Prof. Yoel Groman

Course/Module description:

*Almost toric methods in algebraic and symplectic geometry*

Course/Module aims:

*Aquire the tools of toric, almost toric and tropical geometry, and exposure to advanced topics at their meeting point*

Learning outcomes - On successful completion of this module, students should be able to:

- 1. Investigate the topology of manifolds described by polynomial equations.*
- 2. Generate examples and phenomena in algebraic geometry*

Attendance requirements(%):

*Teaching arrangement and method of instruction:*

Course/Module Content:

- 1. A quick review of basics of algebraic geometry*
- 2. Lattices, fans and polytopes*
- 3. Toric algebraic geometry*
- 4. Toric symplectic geometry*
- 5. Integral affine geometry*
- 6. Almost toric fibrations*
- 7. Advanced topics (depending on time and preferences): Tropical geometry, exotic Lagrangians and Markov triples, Newton Okounkov bodies, toric degeneration, mirror symmetry for log Calabi-Yau surfaces, cusp singularities and Looijenga's conjecture*

Required Reading:

*No required reading*

Additional Reading Material:

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Grading Scheme:

*Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 100 %*

Additional information:

*Brief assignments will be handed out from time to time. These will determine the grade.*