Skoltech
Skolkovo Institute of Science and Technology

Course Syllabus

Course Title (in English)	Integrable systems
Course Title (in Russian)	Интегрируемые системы
Lead Instructor(s)	Krichever, Igor
Is this syllabus complete, or do you plan to edit it again before sending it to the Education Office?	The syllabus is a work in progress (draft)
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1. Annotation

Course Description

Course description: A self-contained introduction to the theory of soliton equations with an emphasis on their algebraic-geometrical integration theory. Topics include:

1. General features of the soliton systems.

2. Algebraic-geometrical integration theory.

3. Hamiltonian theory of soliton equations.

4. Perturbation theory of soliton equations and its applications to Topological Quantum Field Theories and Sieberg-Witten solutions of N=2 Supersymmetric Gauge Theiories

Course Prerequisites / Recommendations	Student should be familiar with basic of Hamiltonian mechanics and complex analysis

2. Structure and Content

Course Academic Level	Master-level course suitable for PhD students
Number of ECTS credits	6

Topic	Summary of Topic	Lectures (# of hours)	Seminars (# of hours)	Labs (# of hours)
General features of the soliton systems.	Lax representation. Zero-curvature equations. Integrals of motion. Hierarchies of commuting flows. Discrete and finite-dimensional integrable systems.	4	4	4
Algebraic - geometrical integration theory.	Spectral transform. Spectral curves. Baker-Akhiezer functions. Theta-functional formulae.	4	4	4
Hamiltonian theory of soliton equations.	Universal symplectic form on the spaces of operators. Action-angle variables and the spectral transform.			
Perturbation theory of soliton equations.	Whitham equations. Generalized hodograph transform. Applications to Topological Quantum field theories, Seiberg-Witten solutions of N=2 SUSY			

3. Assignments

Assignment Type	Assignment Summary
Homework	

4. Grading

Type of Assessment	Pass/Fail

Grade Structure	

Activity Type	Activity weight, %
Class Participation	
Final Exam	

Grading Scale

Attendance Requirements	Optional with Exceptions

5. Basic Information

Course Stream	Other
Course Term (in context of Academic Year)	Term 1 Term 2
Course Delivery Frequency	Every year

Students of Which Programs do You Recommend to Consider this Course as an Elective?

Masters Programs	PhD Programs
Mathematical and Theoretical Physics	

Course Tags	Math Physics

6. Textbooks and Internet Resources

7. Facilities

8. Learning Outcomes

9. Assessment Criteria

Input or Upload Example(s) of Assigment 1:

Input or Upload Example(s) of Assigment 2:

Input or Upload Example(s) of Assigment 3:

Input or Upload Example(s) of Assigment 4:

Input or Upload Example(s) of Assigment 5:

10. Additional Notes