

<b>Course Title (in English)</b>	Hitchin systems and complex geometry
<b>Course Title (in Russian)</b>	Системы Хитчина и комплексная геометрия
<b>Lead Instructor</b>	Rosly, Alexey

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**Course Description**

The subject of this course will be mainly the complex geometry. The choice of topics, however, is determined by their uses in Field Theory and Theory of Integrable Systems. A fundament of the course will be lectures by N.Hitchin (see, a reference below), but with certain digressions and additions. We are not going to study integrable equations on their own, rather, we will consider geometrical constructions, which one can and must employ in describing such equations

<b>Course Prerequisites / Recommendations</b>	Student should be familiar with basic differential and especially complex geometry.
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**Аннотация**

В этом курсе мы будем изучать в основном комплексную геометрию. Выбор тем, однако, определяется интересами теории поля и интегрируемых систем. Основу курса составляют лекции Н.Хитчина (см. ниже) с определёнными отклонениями и дополнениями. Изучения интегрируемых уравнений как таковых не будет, но мы рассмотрим геометрические конструкции, которые можно и нужно применять для описания таких уравнений.

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

Topic	Summary of Topic	Lectures (# of hours)	Seminars (# of hours)	Labs (# of hours)
Hitchin systems	Hitchin systems and complex geometry	26	14	0
Basics on complex geometry	Holomorphic vector bundles, related cohomology. Riemann-Roch Theorem.	4	1	
Basics on sheaf theory	Basics of sheaf theory. Cech cohomology.	4	1	

Assignment Type	Assignment Summary
Final Exam	Solving problems from a list provided by the instructor before the exam

**Type of Assessment** Graded

Grade Structure	Activity Type	Activity weight, %
	Final Exam	100

**A:** 86

**B:** 76

**C:** 66

**D:** 56

**E:** 46

**F:** 0

**Attendance Requirements** Optional

**Course Stream** Science, Technology and Engineering (STE)

**Course Term (in context of Academic Year)** Term 3  
Term 4

**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	Mathematics and Mechanics Physics

**Course Tags**

Math

Required Textbooks	ISBN-13 (or ISBN-10)
N. J. Hitchin, Riemann surfaces and integrable systems. In: Integrable Systems: Twistors, Loop Groups, and Riemann Surfaces (Oxford Graduate Texts in Mathematics, Vol. 4) (Oxford Graduate Texts in Mathematics (No. 4)) 1st Edition, by N. J. Hitchin, G. B. Segal, R. S. Ward	978-0199676774
Гриффитс Филлип А., Харрис Дж. Принципы алгебраической геометрии. В 2 томах. (Мир, 1982)	5-80323-127-4

**Knowledge**

Basic constructions and theorems in complex geometry which are widely used in modern field theory.

**Skill**

Understanding of mathematical terminology encountered in modern theoretical physics papers. Some know-how in exploiting complex geometry in field theory.

**Experience**

Solving problems in complex geometry which are most characteristic and basic for modern theoretical physics.

**Select Assignment 1 Type**

Final Exam

**Input Example(s) of Assignment 1 (preferable)**

Final exam. In the file attached you find a list of sample problems for the final exam.

**Or Upload Example(s) of Assignment 1**<https://ucarecdn.com/692c2207-70d4-4d15-adbe-4c00c7ae9f48/>**Assessment Criteria for Assignment 1**

Solving problems from a list provided by the instructor. Students prepare solutions in advance, before the examination. They are encouraged to start solving problems during the semester. This normally leads to a higher grade because there is time to discuss their solutions and make corrections. However, all the estimates are made by the time of exam. The main goal of the examination is to force students to consider the material of the course in all detail and to achieve a better understanding, which usually comes from "active thinking", rather than "passive". The problems to be solved for this assignment are not technically complicated and, in principle, can be found in literature. However, the main point is how a student understands what he/she has written as a solution. This is easily seen when the discussion with the examiner on the final exam comes.