

## 理学部特別講義

### Interplay between differential equations integrable systems and algebraic geometry

UG - 1

日 程 : 2014年 7月 23~25日 (3日間)

時 間 : 3・4限

場 所 : B301 (理学研究科B棟)



**Motohico MULASE**  
Professor of Mathematics,  
University of California,  
Davis campus

微分方程式, 可積分系についての基本的事項と例を理解し、いくつかの例について微分方程式の相空間を代数幾何的に記述する方法と近年の量子不変量に関する話題について理解を深める。

In this course, we will explain the fundamental facts about differential equations and integrable systems and their examples. We will explain the way to describe phase space in terms of algebraic geometry. Moreover, we will review recent works on its relation to quantum invariants.

#### 授業のテーマと到達目標 (Tentative Schedule)

1. Introduction
2. Differential equations and integrable systems
3. Examples
4. A brief guide to algebraic geometry
5. The WKB method
6. Quantum invariants and integrable systems
7. Further discussion I
8. Further discussion II



**Olivia DUMITRESCU**  
Department of Mathematics  
and Physics,  
Leibnitz University of Hannover

対 象 : 学部 2 年生以上 (文学部の対象は全学年)

お問い合わせ先 : 各学部の教務学生係

## 理学部特別講義 -- Introduction to Natural Sciences, I

UG - 2

日 程 : 2014年 7月 22~25・28~29日 (6日間)  
 時 間 : 5 限  
 場 所 : Z103 ( 理学研究科Z棟 )

### 1) 7/22



**Yoshiyuki TATSUMI**  
Earth and Planetary Sciences

### 地球の記憶を掘り起こせ。国際深海科学掘削計画

Drilling into the Memory of the Earth.

An Introduction to International Ocean Discovery Program

国際深海科学掘削計画(IODP)は、世界26カ国が共同で行う大型国際共同研究であり、地球の変動と進化を明らかにすることを目的としている。日本はこの計画の主導国として、海底下7000mまでの掘削が可能な最新鋭のライザー掘削船「ちきゅう」を投入している。国際的な検討によって、地震発生帯掘削、海洋島弧掘削、それとマントルへの到達を「ちきゅう」が実施することになった。この講義では、これらの掘削計画の目的や意義を紹介する。

The International Ocean Discovery Program (IODP) is an international marine research collaboration between 26 nations dedicated to advancing scientific understanding of the Earth using specialized ocean drilling platforms staffed by multidisciplinary research scientists. Japan is one of the leading nations of IODP and has provided a cutting-edge, riser-equipped deep sea drilling vessel, CHIKYU, which is capable of drilling up to a 7,000m deep sea floor. Internationally endorsed targets for CHIKYU are seismogenic zones that cause ultra large earthquakes such as Nankai earthquakes, intra-oceanic arcs creating continents that typify the planet Earth, and the Earth's mantle that occupies 80% of this planet. This lecture shall introduce these projects that Japan leads.

### 2) 7/23



**Masahiko ARAKAWA**  
Earth and Planetary Sciences

### 地球惑星科学：太陽系の起源と進化

Earth and Planetary Sciences: Origin and Evolution of Solar System

我々の太陽系はどのようにできて、その後進化してきたのでしょうか。太陽系には地球をはじめとする惑星だけでなく、衛星、小惑星、彗星など様々な天体が存在します。このような天体の多様性とその多様性の起源を学びます。また、日本でされている最新の惑星探査の状況を紹介いたします。

How was our solar system formed and evolved?  
 Our solar system has eight planets like the Earth and other various bodies such as satellites, asteroids, and comets. In this class, we learn about the origin and the characteristics of these bodies, and the recent progress of the Japanese planetary exploration of asteroids is introduced.

### 3,4) 7/24,25



**Yuji YAMAZAKI**  
Physics

### ヒッグス粒子はいかにして見つかったか

The experiment to find the Higgs particle

この講義では、2012年に発見され、2013年のノーベル物理学賞につながったヒッグス粒子について、どんな粒子で、どのような実験で発見したかを解説します。

- 1 時間目：素粒子の世界、ヒッグス粒子と質量
- 2 時間目：加速器実験による新粒子発見

In 2012, the long-awaited Higgs particle was finally found at the LHC experiment, which has led to the Nobel Prize in Physics 2013. This lecture explains about how the particle gives mass to other elementary particles and how the new particle were found experimentally.

Lecture 1: the world of elementary particles and the Higgs particle

Lecture 2: accelerator and experiments for finding a new particle

### 5,6) 7/28,29



**Wayne ROSSMAN**  
Mathematics

### How Einsten saw sphere?

In these two lectures we will use only the most basic tools from calculus to introduce two rather remarkable theories. One is the theory of relativity that is now so indispensable for the daily operation of modern-day life. The other is a theory that led to Perelman's solution of the Poincare conjecture, which became headline news worldwide. Our goal is to give an introduction to these two topics that is easily understood and yet still shows their depth. We will approach this with two very down-to-earth applications, as stated in the two titles for the lectures.

Lecture 1: How Einstein saw spheres

Lecture 2: The fence of least perimeter about a farm of given size

## 理学部特別講義 -- Introduction to Natural Sciences, II

UG - 3

日 程 : 2014年 7月30日 ~ 8月1日, 8月4 ~ 6日 (5日間)  
時 間 : 5 限  
場 所 : Z103 ( 理学研究科Z棟 )

1) 7/30



Hidehiro FUKAKI  
Biology,

### 生物学：植物科学への招待

Biology: Introduction to Plant Science

植物とはどんな生物でしょうか？ 植物はどうやって生きているのでしょうか？ 植物は私たちに何を与えてくれるのでしょうか？ この講義では、植物に関する基礎的な知識を扱うとともに、植物科学の重要性と未来について考えます。

What is a plant? How do plants live? What do plants give us? This lecture provides basic knowledge on plants and discusses the importance and future of plant science.

2) 7/31



Mitsuhiro MORITA  
Biology

### 脳の進化

Evolution of the Brain

ヒトの脳を理解する事は現代科学の最も重要な問題のひとつです。微細な指の動き、感情、言語、生存競争に必要な計画性といった多様な機能が脳の情報処理によって生まれます。こういった機能が進化の過程で、それぞれ独自の神経回路を形成することによって発達したことを概説します。

The human brain is the last frontier of modern science. Fine control of finger movement, emotion, language, and strategic planning for surviving in the wild, as well as in our society are all consequences of information processing by the brain. This talk focuses on the evolution of diverse brain functions by virtue of emerging unique neural networks.

3) 8/1



Takuya SATO  
Biology

### 生態学：生物多様性の時空間変動とそのメカニズム

Ecology: Exploring biodiversity in space and time

地球上にはどれほどの生物種が生息しているのでしょうか？ 多様な種は時間的・空間的にどのように共存し、生態系過程（炭素循環等）の一部として機能しているのでしょうか？ この授業では、生態学の基礎理論を通して、上記の問いに答えられる知識を身に着けます。

How many species inhabit planet earth? How species can co-exist, and function to maintain ecological processes, including carbon and nutrient cyclings? Students will learn basic concepts of Ecology that will be helpful in answering the above questions.

4,5) 8/4,5



Ryousuke MATSUBARA  
Chemistry

### 化学：分子の科学

Chemistry: Science of Molecules

薬はどのように痛みを和らげるのでしょうか？ 昆虫はどのようにパートナーを見つけるのでしょうか？ 石油からアイスクリームの匂いが作れるのでしょうか？ 化学の基礎を学びとこれらの質問に答えられます。

How does medicine relieve pain? How can insects lure their partner? Can we make ice-cream's smell from petroleum? Students will learn very basic chemistry in this class and acquire the knowledge necessary to answering these questions.

6) 8/6



Yasuhiro KOBORI  
Chemistry

### 化学：光合成と太陽電池

Chemistry: photosynthesis and solar cell

生体分子はどのように太陽光を化学エネルギーに変えるのでしょうか？ 有機太陽電池はどのように光電流を生み出すのでしょうか？

本講義では量子化学の基本を学び、光エネルギー変換の仕組みを理解します。

How do biological molecules convert sunlight to chemical energy? How do organic solar cells generate photocurrent? Students will learn very basic quantum chemistry to understand the mechanism of photo-energy conversions.



# Kobe Summer School 2014

UG - 4

July 28 -- August 6, 2014

## Introduction to Japanese Culture and Society



**Hillary PEDERSEN**

Lecturer of Japanese Studies,  
Ritsumeikan University

### 1. July 28 (4th Period):

#### Buddhist Images in Japanese Culture and Society

While many Japanese Buddhist monuments are now popular tourist destinations, the original contexts of their production had wide-reaching effects upon many spheres of Japanese society. Aside from religious meaning, Buddhist image production had profound influence upon the Japanese economy, politics, and foreign relations. This lecture will begin with a discussion of key Buddhist concepts and related visual expressions in Japan. I will explore both distinctive native characteristics as well as the role of Japan in an international network of Buddhist image production.



**Kiyomitsu YUI**

Professor of Sociology, Kobe  
University

### 2. July 29 (4th Period):

#### Japanese Sub-culture and Globalization

The lecture will focus on Japanese sub-culture as a global phenomenon in the age of decentered globalization. In its phase of "traveling," this lecture will take up examples of Japanese sub-culture such as costume play and comic market events in conjuncture with contemporary cultural industries in Japan.



**Nobuo KAZASHI**

Professor of Philosophy, Kobe  
University

### 3. July 30 (4th Period):

#### Japan's Dilemma over the Nuclear: A Historical Overview

The atomic bombing marks a decisive turn in modern Japan, but its significance has not been univocal. It has become a cornerstone for Japan's post-war pacifism. However, it has been doubly twisted by the fact that Japan has chosen, not only to be under the U.S.'s nuclear umbrella, but also to promote nuclear power generation in the name of "peaceful use," which resulted eventually in the Fukushima disaster. This lecture brings into light Japan's dilemma by reflecting on some critical incidents such as the 1954 contamination of the Lucky Dragon 5 followed by the anti-nuclear surge as well as some nuclear-related works such as Astro Boy, Godzilla and Hiroshima Mon Amour.



**Keiko ISHII**

Associate Professor of Psychology,  
Kobe University

### 4. July 31 (4th Period)

#### Cultural Psychology: A Comparative Perspective

Cultural psychologists have explored a mutual relationship between culture and the mind by addressing how cultural practices influence the manner in which people think, feel, and behave, and how people's culturally constructed psychological processes shape social and cultural environments. In my lecture, I will describe the theoretical framework of studies from a cross-cultural perspective. Next, I will present some of the recent studies on the mode of thought in terms of a comparison between Western and Eastern cultures and an exploration of mechanisms underlying cultural differences. Finally, I will discuss future directions in this research area.



# Kobe Summer School 2014

UG - 4

July 28 -- August 6, 2014

## Introduction to Japanese Culture and Society

### 5. August 4 (4th Period)



#### Japan's Hamlet

This lecture will consider how Japanese writers responded to Hamlet, the world-famous Shakespeare tragedy. By introducing several adaptations of the play, I will illustrate how different Japanese authors negotiated the personal, cultural, and national issues and conflicts that arose when they associated their work with Shakespeare's.

**Kaori ASHIZU**

Associate Professor of English Literature, Kobe University

### 6. August 5 (4th Period)



#### Blossoms Before Moss: Rethinking Zen Aesthetics at Saihōji Temple

A UNESCO World Heritage site, Saihōji temple in Western Kyoto is better known today as "The Moss Temple" ("Kokedera"). With its green moss carpet and dry rock waterfall, the garden is often held up as a prime example of medieval Zen landscape design. Pre-modern literature about the temple, however, suggests that Saihōji was celebrated not for its muted moss or austere rocks but for its vibrant cherry blossoms—a feature not commonly associated with Zen in the modern mind. This lecture will examine the vital role played the cherry blossoms in literature about Saihōji, and, in doing so, invite students to challenge their assumptions about Zen Buddhist aesthetics.

**Molly VALLOR**

Assistant Professor of Japanese Studies, Kobe University

### 7. August 6 (3rd Period)



#### Globalizing the Ethics of Emptiness: On the Reception and Possibilities of Watsuji's Ethics in English

Watsuji's Ethics emerged within the context of the influx of Western philosophy into Japan and World War II, as an attempt to carve out a Japanese theory of ethics that might support Japan through this turbulent period. However, Watsuji's reception in the English language has appropriated him for largely different ends. I will examine attempts to use Watsuji to rethink the west's own problems—relationality, the liberal-communitarian debates, moral relativism—focusing on the Buddhist-inspired idea of emptiness as the core of his contribution, thus demonstrating both philosophical analysis and a case in the dynamics of the inter-cultural transfer of philosophical ideas.

**Anton Luis Sevilla**

Instructor of Ethics, Ateneo de Manila University of Ethics, Philippines

### 8. August 6 (4th Period): Discussion

Round-table discussion on the topics related to the preceding lectures. The students are encouraged to actively participate in the discussion so as to deepen their understanding and broaden their perspectives.

**Moderator:**

**Hideyuki YAMAMOTO**

Professor of American Literature, Kobe University



# Kobe Summer School 2014

UG - 5

August 4--11, 2014

## 工学部特別講義 -- Introduction to Materials Science

### 日 程

1. 8月4日(月)5限 (担当：水畑・Faupel)
2. 8月5日(火)5限 (担当：Faupel)
3. 8月6日(水)5限 (担当：西野)
4. 8月7日(木)5限 (担当：Faupel)
5. 8月8日(金)5限 (担当：藤井)
6. 8月11日(月)2限 (担当：Faupel)
7. 8月11日(月)3・4限 (担当：水畑)

### 材料科学への誘い

#### -高分子/金属ナノ粒子コンポジットから高機能電子材料まで Introduction to Materials Science



Franz FAUPEL

Visiting Professor, Ph.D  
CAU of Kiel, Germany

Faupel教授は長年にわたって、高分子/金属ナノ粒子コンポジットに関する物性に関する研究を行ってこられました。特に金属-高分子界面の構造に関する研究は世界的にも高い評価を得ており、300にも及ぶ学術論文にその結果が記されています。

特に、半導体技術のフレキシブル基板材料の構造や耐久性にかかわる研究や金属ナノ粒子の電子の挙動についての実験手法の開発においては、化学のみならず、物理学や数学の知識を駆使して、その解釈にあたっておられます。

Faupel教授はクリスチャン・アルブレヒト・キール大学工学部の教授として教鞭をとっておられ、本年7月から客員教授として神戸大学に滞在されます。この期間を活用し、ドイツにおける大学のような学生の国際交流の状況、研究室の様子などの紹介も行われます。講義内容についてはできる限り平易な専門用語を用いることになっていますので、積極的に受講して下さい。

Professor Franz Faupel has been studying on polymer/metal nanocomposite in viewpoints of physics and interfacial chemistry. His studies have been in terms published on more than 280 academic papers. Hybrid materials consisting of metal nanoparticles dispersed in a dielectric matrix are the subject of extensive research due to their novel functional properties offering hosts of new applications. Polymers are particularly attractive as matrix. Consequently, various approaches have been reported to incorporate metal nanoparticles into polymers. His research group focuses on the preparation of polymer-based nanocomposites by vapor phase co- and tandem deposition and the resulting functional properties. The techniques involve evaporation and sputtering, respectively, of metallic and organic components and inter alia allow the preparation of composites which contain alloy clusters of well defined composition. Recently, we also started to use inorganic matrix materials. Emphasis is placed on soft-magnetic high frequency materials with cut-off frequencies well above 1 GHz and optical composites with tuned plasmon resonances suitable for ultra thin color filters, Bragg reflectors, and other devices. In addition, antibacterial coatings and sensors for organic vapors are investigated. The latter take advantage of the steep drop of the electrical resistivity at the percolation threshold. Moreover, he recently found a novel approach to producing magnetic nanorods for potential applications in high-density data storage and other fields.

<http://www.tf.uni-kiel.de/~ff/>

<http://www.tf.uni-kiel.de/matwis/matv/index.php>



# Kobe Summer School 2014

UG - 6

September 8, 19, 22 (3 days, 2~4period), 2014

## 農学への招待 (Introduction to Agricultural Sciences)

The Faculty of Agriculture has objectives to train human resources that will be capable to give to communities both locally and internationally through research and technology development on agricultural sciences. In this course, foreign professors invited from overseas give lectures in English to produce human resources equipped with a global perspective in the area of agricultural sciences.

Students who participate in the course listen to not only English lectures, but also commentaries by Japanese professors and work on writing English reports. This class proposes to enrich their international sense by being familiar with lectures and discussions in English and having a chance to find out the present state of agriculture in foreign countries and the research of agricultural sciences.

### アフリカ, 特にスーダンにおける灌漑農業の進展について (9月8日) Development of irrigated agriculture in Africa, especially in Sudan



**Bashir  
Mohammed  
Ahmed Adam**  
Agricultural Research  
Corporation, Sudan



**Haruya TANAKAMARU**  
Professor of Department of  
Agricultural Engineering  
and Socio-Economics,  
Kobe University

### 乳酸菌など腸内細菌のヘルスバイオサイエンス (9月19日) Health bioscience in gut flora including lactic acid bacteria



**Maarten van  
de Guchte**  
The French National  
Institute for Agricultural  
Research, France



**Ken-ichi YOSHIDA**  
Professor of Department of  
Agrobioscience,  
Kobe University

### 東南アジア, 特にフィリピンにおけるプラントヘルスサイエンス (9月22日) Plant health science in Southeast Asia: Focus on the Philippines



**Christian  
Joseph  
Rili Cumagun**  
University of the  
Philippines Los  
Baños, Philippines



**Yukio TOSA**  
Professor of Department  
of Agrobioscience,  
Kobe University

# 夏季英語集中講義 「農学への招待」 履修者募集のお知らせ

農学部では、農学の各分野でご活躍の外国人研究者をお招きし、グローバルな視点を醸成することを目的として、以下の通り、臨時開設科目を開講します。外国人教員による英語講義に加え、日本人教員による解説を含みます。奮ってご参加下さい。

平成26年7月7日(月)から7月31日(木)までの間、  
教務学生係にて履修登録手続きを行います。

**開講日：** 平成26年 9月 8日(月) 2～4時限  
平成26年 9月19日(金) 2～4時限  
平成26年 9月22日(月) 2～4時限

**講義室：** 農学部 B401教室

**対象学生：** 農学部全コース 1～4年生対象

**種別・単位：** 臨時開設科目・1単位  
(卒業要件単位となります)

**講義形式：** 左側に記載の3トピックについてそれぞれ3コマの授業を実施します。そのうち2コマは外国人教員による英語講義、1コマは日本人教員による解説と小レポート(英文)の作成に充てます。

**成績評価：** 各トピックの小レポートで評価します。

**注意)** 正規の履修登録だけでなく、一部トピックのみの聴講(単位なし)も認めます。ただし、聴講の場合も教務務学生係で手続きをして下さい。

**問い合わせ先：** 田中丸 治哉 tanakam@kobe-u.ac.jp





# Kobe Summer School 2014

UG - 7

## 特別講義 —海事を科学するⅠ— Introduction to Maritime Sciences I

日 程 : 2014年 8月 5, 6日 (2日間)

時 間 : 1~4 限

場 所 : 海事科学部4号館 4303



**Takeshi Nakazawa**  
International Association  
of Maritime Universities (IAMU)

**J. Paul Marlowe**  
Graduate School of Maritime Sciences,  
Kobe University

UG - 8

## 特別講義 —海事を科学するⅡ— Introduction to Maritime Sciences II

日 程 : 2014年 8月 7, 8日 (2日間)

時 間 : 1~4 限

場 所 : 海事科学部総合学術交流棟5階 会議室(深江キャンパス)



**Michael Woodward**  
School of Marine Science  
and Technology  
Newcastle University, U.K.



**Akira Kawaguchi**  
Department of Computer Science  
Grove School of Engineering  
The City College of New York, U.S.A

Please submit a registration form to the Academic Affairs Section of the Faculty of Maritime Sciences. Registration Period: July 31<sup>st</sup>, 2014

UG-7

海事科学部 特別講義 — 海事を科学する I

Special Lecture in Undergraduate Course: Introduction to Maritime Sciences, I

#### Dates & Venue

August 5 (TUE) 1<sup>st</sup> – 4<sup>th</sup> Periods Building 4 3F Room 4303 (Fukae Campus)

August 6 (WED) 1<sup>st</sup> – 4<sup>th</sup> Periods Building 4 3F Room 4303 (Fukae Campus)

中澤 武 Takeshi NAKAZAWA (International Association of Maritime Universities)

Lecture topic: Energy Efficient Operation of Ships

Aims: To provide a foundational level understanding of the relationship between energy used for shipping and generation of carbon dioxide(CO<sub>2</sub>); to emphasize importance of IMO's approaches to reduce CO<sub>2</sub> generated from shipping and technology to support those approaches; and to provide contemporary issues on marine engineering related to the development of merchant vessels.

Contents: IMO's Studies of GHG Emissions from ships; IMO's approaches to reduce CO<sub>2</sub>; EEDI, EEOI and SEEMP; Cost of energy to operate ships; Basic facts about ship propulsion; Type of engine and their merits; Technical development of merchant vessels

References and Recommended Reading:

IMO (2000), Study of Greenhouse Gas Emissions from Ships

IMO (2009), MEPC 59/INF.10, Second IMO GHG study 2009

Lloyd's List, Future of Shipping, December 2009

Other IMO documents related to the reduction of GHG

J. Paul MARLOWE (Graduate School of Maritime Sciences, Kobe University)

Lecture topic: Authentic maritime role-play in English

Seminar Description: This seminar is designed to provide you practice in using English in situational contexts. The course will revolve around role-play situations that represent authentic situations in which English is used in Maritime related contexts. We will first examine an example role-play situation, then practice in pairs or group, and finally perform. The rest of the day will be devoted to working in groups with students with related Maritime

career interests, brainstorming an authentic situation in which English is used in that circumstance, researching useful language for that situation, developing a role play, practicing that role play, and finally performing the role play for the class.

Seminar Goals: Students will...

Examine, practice, and perform an example authentic maritime role-play situation

Design, research, and develop an authentic maritime role-play to perform in pairs or groups

Assessments:

Participation (30%) + Group Work (30%) + Performance (40%) = 100%

UG-8 海事科学部 特別講義 — 海事を科学するⅡ

Special Lecture in Undergraduate Course: Introduction to Maritime Sciences, II

Dates & Venue

August 7 (THU)	1 <sup>st</sup> – 4 <sup>th</sup> Periods	Academic Exchange Center 5F Meeting Room (Fukae Campus)
August 8 (FRI)	2 <sup>nd</sup> – 5 <sup>th</sup> Periods	Academic Exchange Center 5F Meeting Room (Fukae Campus)

Michael WOODWARD (Newcastle University, U.K.)

Lecture topic: Dynamic response of ships including: Maneuvering, Seakeeping and Stability  
< Detailed information is coming soon. >

川口 明 Akira KAWAGUCHI (The City College of New York, U.S.A.)

Lecture topic: Introduction to dynamic programming

Abstract: Dynamic programming solves complex problems in way of breaking down into much simpler subproblems and then combining the solutions to subproblems. Note that "Programming" refers to a tabular method, not to writing computer code. Hence, attending this lecture requires no skills for advanced mathematics or computer programming. We typically apply dynamic programming to optimization problems (minimization or maximization) that may have many possible solutions. There is a close relationship to well-known divide-and-conquer solutions that partition the problem into disjoint subproblems, solve the subproblems recursively, and then combine their solutions to solve the original problem. In contrast, dynamic programming applies when the subproblems "overlap," that is, when subproblems share subsubproblems. Dynamic programming solves each subsubproblem just once and then saves its answer in a table, thereby avoiding the work of recomputing the answer every time it solves each subsubproblem. Tailored for the Kobe University's maritime sciences, this lecture will open your eyes to this important subject, from optimization techniques to an interesting world of algorithmic computations, and power up your skill training in general sciences.

## A mathematical theory of quantum curves

G - 1

日 程 : 2014年 7月28日~8月1日 ( 5日間 )  
時 間 : 3・4・5時限  
場 所 : B314 ( 理学研究科B棟 )

### A mathematical theory of quantum curves : what they are, and what they do



**Motohico MULASE**  
Professor of Mathematics,  
University of California,  
Davis campus

The theme of the course is to present recent exciting developments around the notion of “quantum curves” that relates many research frontiers of mathematics and theoretical physics. The goal is to develop a mathematical theory of this emerging field of research invariants. After reviewing classical theory, we will explain the theoretical background of this new field of mathematics. The quantum curves connect classical theory of differential equations and modern theory of topological invariants, such as Gromov-Witten, Seiberg-Witten, and quantum knot invariants. The course develops a universal structure of these invariants, originated by various groups of physicists, based on geometry and analysis of Riemann surfaces.



**Olivia DUMITRESCU**  
Department of Mathematics  
and Physics,  
Leibnitz University of Hannover

1. How do we see the moduli spaces of curves?
2. The parabola  $x = y^2$  knows the Witten-Kontsevich theory
3. Quantum invariants give the exact WKB analysis of classical ODEs
4. The simplest example of the topological recursion is Catalan numbers
5. The mathematical framework of the theory is the Hitchin fibrations
6. Geometry of ruled surfaces, log Calabi-Yau spaces, and the Hilbert scheme of points
7. From Gromov-Witten to Seiberg-Witten via a spectral curve - a glimpse of KP equations

***This course is designed to be an attractive introduction to the emerging new theory of the field. Motivated students in Mathematics and Mathematical Physics are welcome to the course!***

対象：博士課程前期課程・博士課程後期課程  
※履修登録が必要です。詳しくはシラバスをご覧ください。