科目コード (Code)	科目名 (Course title)	Course title (English)
10C070	基礎量子科学	Introduction to Quantum Science
10C072	基礎量子エネルギー工学	Introduction to Advanced Nuclear Engineering
10C004	場の量子論	Quantum Field Theory
10C074	量子科学	Quantum Science
10C013	核材料工学	Nuclear Materials
10C014	核燃料サイクル工学１	Nuclear Fuel Cycle 1
10C015	核燃料サイクル工学２	Nuclear Fuel Cycle 2
10C017	放射線物理工学	Radiation Physics and Engineering
10C018	中性子科学	Neutron Science
10C076	基礎電磁流体力学	Fundamentals of Magnetohydrodynamics
10C034	核エネルギー変換工学	Nuclear Energy Conversion and Reactor Engineering
10C037	混相流工学	Multiphase Flow Engineering and Its Application
10C038	核融合プラズマ工学	Physics of Fusion Plasmas
10C078	複合加速器工学	Advanced Accelerator Technology
10C080	原子炉安全工学	Nuclear Reactor Safety Engineering
10C082	応用中性子工学	Applied Neutron Engineering
10C047	放射線医学物理学	Medical Physics
10C084	原子核工学最前線	Nuclear Engineering, Adv.
10C068	原子力工学応用実験	Nuclear Engineering Application Experiments
10C086	原子核工学序論１	Introduction to Nuclear Engineering 1
10C087	原子核工学序論２	Introduction to Nuclear Engineering 2
10W620	医学放射線計測学	Radiation Measurement for Medicine
10i061	先端マテリアルサイエンス通論（4回コース）	Introduction to Advanced Material Science and Technology(4 times course)
10i062	先端マテリアルサイエンス通論（8回コース）	Introduction to Advanced Material Science and Technology(8 times course)
10i063	先端マテリアルサイエンス通論（12回コース）	Introduction to Advanced Material Science and Technology(12 times course)
10i055	現代科学技術特論（4回コース）	Advanced Modern Science and Technology(4 times course)
10i056	現代科学技術特論（8回コース）	Advanced Modern Science and Technology(8 times course)
10i060	現代科学技術特論（12回コース）	Advanced Modern Science and Technology(12 times course)
10i046	実践的科学英語演習Ⅱ	Exercise in Practical Scientific English II
10i057	安全衛生工学（4回コース）	Safety and Health Engineering(4 times course)
88G101	研究倫理・研究公正（理工系）	Research Ethics and Integrity(Scienceand Technology)
88G202	情報科学基礎論	Introduction to Information Science
10C050	インターンシップＭ（原子核）	Engineering Internship M
10i011	工学研究科国際インターンシップ２	International Internship in Engineering 2
10C063	原子核工学特別実験及演習第一	Experiments and Exercises on Nuclear Engineering, Adv.I
10C064	原子核工学特別実験及演習第二	Experiments and Exercises on Nuclear Engineering, Adv.II
10C089	原子核工学セミナーA	Seminar on Nuclear Engineering A, B
10C090	原子核工学セミナーB	Seminar on Nuclear Engineering A, B

未更新

Numbering code			
Course title <English>	基礎量子科学 Introduction to Quantum Science	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,SAITOU MANABU Graduate School of Engineering Associate Professor,MAJIMA TAKUYA

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Fri.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,9times,
,2times,
,3times,
,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	基礎量子エネルギー工学 Introduction to Advanced Nuclear Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Professor,SASAKI TAKAYUKI

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Tue.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,15times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	場の量子論 Quantum Field Theory	Affiliated department, Job title,Name	Graduate School of Engineering Assistant Professor,OGURE KENZOU Graduate School of Engineering Associate Professor,MIYADERA TAKAYUKI

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Thu.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

An introduction to quantum field theory is presented with an emphasis on its mathematical difficulties.

[Course Goals]

Our aim is to understand the difficulty of relativistic quantum field theory caused by the Poincare covariance and the infinite degrees of freedom.

[Course Schedule and Contents]

1. Introduction

Free field
2. Special relativity (1)
3. Special relativity (2) Poincare group
4. Relativistic quantum mechanics (1) Wigner's theorem
5. Relativistic quantum mechanics (2) Irreducible representation of Poincare group
6. Many particles
7. Free field (1) Klein-Gordon equation
8. Free field (2) Weyl algebra and Haag-Kastler axiom

Interaction
9. Classical theory
10. Deformation quantization
11. Wick ordering and microlocal analysis
12. Time ordered product
13. Time ordered product and Feynman diagram
14. Renormalization
15. Recent topics

1-14. Miyadera, 15. Ogure

[Class requirement]

Analysis, linear algebra, quantum mechanics

[Method, Point of view, and Attainment levels of Evaluation]

exam

Continue to 場の量子論(2)↓↓↓

場の量子論(2)

[Textbook]

Not used

[Reference books, etc.]

（Reference books）

None

[Regarding studies out of class (preparation and review)]

Clarify what you have learnt and your questions.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	量子科学 Quantum Science	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,MATSUO JIROU Graduate School of Engineering Associate Professor,MAJIMA TAKUYA

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.1	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

This course involves fundamental interactions of electrons, ions and photons to atoms, molecules and condensed matters, and practical applications for nanotechnology. Great emphases are on fundamental mechanisms of beam-solid interactions, characterization techniques, material synthesis and processing for quantum devices with quantum beam. Recent progress of related area of quantum beam will be also introduced in this course.

[Course Goals]

To provide students to understand fundamental interactions in quantum science.

[Course Schedule and Contents]

Interactions between quantum beams and solids,7times,Interactions between quantum beams and solids are described with various formulas. Collisions with nucleus, electronic excitation, defect formation and energy loss will be discussed and related scientific topics, such as discovery of electron will be introduced.
Applications of quantum beams,7times,The interactions of quantum beam are widely used for various applications. Material processing and analysis with quantum beams are essential in nanotechnology and quantum beams are also important for diagnostics of diseases and cancer therapy in medical field. Practical applications will be presented with recent progress and challenges.
Final examination and report,1time,Evaluation will be given by the contents of the reports and quizzes of the subjects leaned in this course.

[Class requirement]

Solid state physics, Quantum mechanics(beginnerrsquos), Electromagnetism

[Method, Point of view, and Attainment levels of Evaluation]

Coursework will be evaluated with attendance and report on subjects.

[Textbook]

Ion-Solid Interactions: Fundamentals and Applications (Cambridge Solid State Science Series) M. Nastasi, J. Mayer, J. Hirvonen

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	核材料工学 Nuclear Materials	Affiliated department, Job title,Name	Graduate School of Engineering Professor,TAKAGI IKUJI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Tue.1	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Nuclear fusion reactors and fission reactors present severe challenges such as high temperatures, high pressure, and high radiation fields, and the nuclear materials used in them are selected with reference to various properties. This course describes in detail major nuclear materials such as nuclear fusion reactor blankets, plasma facing materials, reactor pressure vessels, and fuel cladding, as well as other nuclear materials. Also, we hold roundtable discussions to learn about the latest breakthroughs in research and development.

[Course Goals]

The goal of the course is to understand how the performance and safety of systems such as nuclear fusion reactors and fission reactors are related to the properties of materials, and to comprehend trends in materials research for improving performance and safety.

[Course Schedule and Contents]

Fission reactor materials, 5 classes: Give an overview of fission reactors and discuss the below components.
- Fuel (recoverable reserves, uranium abundance ratio, nuclear cross sections, MOX)
- Cladding material (zirconium alloy, corrosion, hydrogen embrittlement)
- Control material (absorption cross sections, control rods, burnable poisons)
- Moderators (scattering cross sections, moderating efficiency, diffusion length)
- Coolants (thermal properties, radioactivation, furnace types)
- Structural materials (pressure vessels, mechanical properties, radiation damages)

Nuclear fusion reactor materials, 4 classes: Give an overview of nuclear fusion reactors and explain their development history (tokamak, helical, inertial) as well as the below components.
- Structural materials (radioactivation, radiation damages, mechanical properties, effects of 14MeV neutrons)
- Coil materials (alloy superconductivity, compound superconductivity)
- Blankets (tritium breeding materials, neutron multiplication materials, fuel cycle)
- Plasma facing materials (loss and redeposition, hydrogen recycling, tritium inventory and leakage)

Latest research trends, 5 classes: Students present information they have researched on the latest in research and development, and related question and answer sessions and debates are held.

Feedback class, 1 lecture: Review the reports assigned in class as well as students’ presentations and question and answer sessions.

Continue to 核材料工学(2)↓↓↓

核材料工学(2)

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Grade is based on active participation in class, including question and answer sessions, reports and presentations. Reports will be evaluated based on attainment of goals.

It is required to hand in both reports, and those that show independent thinking will be given high scores.

[Textbook]

In addition, printouts will be distributed in class.

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

None.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	核燃料サイクル工学 1 Nuclear Fuel Cycle 1	Affiliated department, Job title,Name	Graduate School of Engineering Professor,SASAKI TAKAYUKI Graduate School of Engineering Associate Professor,TAISHI KOBAYASHI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Wed.1	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

Introduction,1time,
Nuclear fuel,3times,
Actinide chemistry,3times,
Disposal management,4times,
Decomissioning,1time,
Recent topics,2times,
Support,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code	G-ENG08 7C015 LJ28		
Course title <English>	核燃料サイクル工学2 Nuclear Fuel Cycle 2	Affiliated department, Job title,Name	Institute for Integrated Radiation and Nuclear Science Professor,YAMAMURA Tomoo

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Wed.4	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

原子力発電に関わる核燃料工学の中から，放射性廃棄物の計画・設計を行う際に必要となるアクチノイド凝縮系物質の基礎となる理論と応用を論ずる．アクチノイド物性化学の立場から，関連する放射化学、無機化学、固体物理学、金属工学に関する基礎事項を講述し，長寿命放射性廃棄物としての管理・保管・処理や、アルファ放射体としてのアクチノイド元素の医療応用における各物理化学量の予測手法へ応用できる研究手法と解析方法を講述する．

[Course Goals]

燃材料に使われるアクチノイドにおける凝縮系諸相の安定性と調製法、非結晶性および結晶性物質における電子秩序による準位形成のメカニズム，これを利用した分光・回折の考え方，核反応のホストとしての材料としての捉え方を習熟する．

[Course Schedule and Contents]

・概論（1）　講義内容の概要説明と授業の進め方の説明を行う．
・系列元素の性質（2）アクチノイド元素の核的・物理化学的性質を説明し，元素の製造法やその経緯を説明する．結晶に見られるイオン半径におけるアクチノイド収縮や、電子の充填状況について説明する．
・燃材料（3）熱力学平衡に基づく相図の作成法を説明する。この相図を用いてアクチノイド凝縮系諸相（液体、金属、酸化物、金属間化合物、溶液）の熱的・構造的安定性を説明する。原子炉（軽水炉、高速炉）で利用される核反応を説明し、原子炉燃料として利用しうる相やその製造法を説明する。
・電子準位と分光（4）アクチノイドのf電子が示す常磁性における磁気モーメントの評価法、運動量の結合様式、基底項（状態）と励起状態について説明する。励起状態としてゼーマン効果、分子振動も加え、この励起準位間の遷移を利用するアクチノイドの分光等について説明する。
・固体物理（4）結晶における固体物理の基礎を復習する。アクチノイド系物質の純良結晶育成の実験手法を説明する。結晶の構造や磁性、伝導帯に関する放射光や中性子を用いた回折法等の手法を説明する。最後に最近の研究のトピックを説明する。
・放射性廃棄物の管理や利用（1）核消滅の必要性やその手法について説明する。また、原子力電池、核医薬などにおけるアクチノイドの利用について説明する。
・学修到着度の確認(1) 学修到達度の確認を行う.

[Class requirement]

None

Continue to 核燃料サイクル工学2(2)↓↓↓

核燃料サイクル工学2(2)

[Method, Point of view, and Attainment levels of Evaluation]

出席（50点）と期末試験（50点）による.

[Textbook]

C. キッテル、『キッテル 固体物理学入門 第8版』（丸善）ISBN:978-4621076569

[Reference books, etc.]

（Reference books）

Introduced during class

[Regarding studies out of class (preparation and review)]

講義資料による予習・復習を充分行うこと。

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	放射線物理工学 Radiation Physics and Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KANNO IKUO

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Fri.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,3times,
,5times,
,2times,
,2times,
,2times,
,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code	G-ENG08 5C018 LJ57		
Course title <English>	中性子科学 Neutron Science	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,TASAKI SEIJI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Fri.1	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

中性子散乱、中性子の応用の論文を読み、その内容を分かりやすく紹介する。
英語論文を読み取ることに習熟するとともに、分かりやすいプレゼンテーションの方法の取得も目的とする。

[Course Goals]

基礎科学から応用まで広く使われている中性子の適用例について学ぶ。
英語論文を読み、内容を理解した上で、分かりやすく紹介するスキルを磨く。

[Course Schedule and Contents]

第01回 中性子科学とは
第02回～第08回 中性子源、中性子散乱理論、中性子散乱実験に用いるデバイス等、基礎的な中性子散乱研究に関する英語教科書の輪読
第09回～第14回 中性子を用いた種々の技法、中性子干渉、ラジオグラフィ、物性研究など中性子を用いた研究に関する論文の輪講
第15回 学習到達度の評価
第16回 フィードバック

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

論文等の内容をまとめた発表および期末に課されるレポートの内容を以って採点する。

[Textbook]

発表で使う資料はあらかじめ配布する。

[Reference books, etc.]

（Reference books）
I. I. Gurevich and L. V. Tarasov 『Low Energy Neutron Physics』（North Holland Publishing Co.）ISBN: 0720401348
その他必要に応じて授業中に紹介する

[Regarding studies out of class (preparation and review)]

自分の担当部分の内容について事前によく調査すること。教員に質問に来るのもよい。

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	基礎電磁流体力学 Fundamentals of Magnetohydrodynamics	Affiliated department, Job title,Name	Graduate School of Engineering Professor,MURAKAMI SADAYOSHI Graduate School of Engineering Professor,YOKOMINE TAKEHIKO

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Thu.2	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

This course provides fundamentals of magnetohydrodynamics which describes the dynamics of electrically conducting fluids, such as plasmas and liquid metals. The course covers the fundamental equations in magnetohydrodynamics, dynamics and heat transfer of magnetofluid in a magnetic field, equilibrium and stability of magnetized plasmas, as well as illustrative examples.

[Course Goals]

The students can understand fundamentals of magnetohydrodynamics which describes the dynamics of electrically conducting fluids, such as plasmas and liquid metals. Moreover, the students will figure out the applications of magnetohydrodynamics to the various science and engineering fields.

[Course Schedule and Contents]

Liquid Metal MHD,7times,1. Introduction and Overview of Magnetohydrodynamics \\ 2. Governing Equations of Electrodynamics and Fluid Dynamics \\ 3. Turbulence and Its Modeling \\ 4. Dynamics at Low Magnetic Reynolds Numbers \\ 5. Glimpse at MHD Turbulence amp Natural Convection under B field \\ 6. Boundary Layers of MHD Duct Flows \\ 7. MHD Turbulence at Low and High Magnetic Reynolds Numbers Plasma MHD,8times,1. Introduction to Plasma MHD \\ 2. Basic Equation of Plasma MHD \\ 3. MHD Equilibrium \\ 4. Axisymmetric MHD Equilibrium \\ 5. Ideal MHD Instabilities \\ 6. Resistive MHD Instabilities \\ 7. MHD Waves in Plasmas \\ 8. Student Assessment

[Class requirement]

Fundamental fluid dynamics and electromagnetics should be learned prior to attend this lecture.

[Method, Point of view, and Attainment levels of Evaluation]

Attendance and two reports

[Textbook]

Handout of the presentation will be provided at the lecture

[Reference books, etc.]

（Reference books）

P. A. Davidson, ldquoAn Introduction to Magnetohydrodynamics,rdquoCambridge texts in applied mathematics, Cambridge University Press, 2001

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	核エネルギー変換工学 Nuclear Energy Conversion and Reactor Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,KAWARA ZENSAKU

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,1time,
,3times,
,2times,
,3times,
,2times,
,4times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	混相流工学 Multiphase Flow Engineering and Its Application	Affiliated department, Job title,Name	Graduate School of Engineering Professor,YOKOMINE TAKEHIKO

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Wed.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Reviewing of the fundamental definition and characteristics of multiphase flows, and to learn the governmental equations and some modelings of the constitutive equations and the current status of the multiphase flows. Moreover, to review and learn the fundamental definition and characteristics of particle flows, and to learn the numerical methods to track the particle laden flows and the particle measurement method.

[Course Goals]

As for the multiphase flows, to learn its fluid dynamics behaviors, governing equations and numerical methods, and finally to discuss its applications to many engineering fields.

[Course Schedule and Contents]

What#039s the multiphase flows?,1time,To review the definitions and fundamental characteristics of multiphase flows.
Governing equation of gas-liquid two phase flows,2times,To learn the governing equation of gas-liquid two phase flows
Modeling of gas-liquid two phase flows,2times,To learn modeling of gas-liquid two phase flows and its constitutive equations
Numerical methods,3times,To learn the numerical methods to solve the single-phase and two-phase flows
Examples of gas-liquid two phase flow analysis,1time,To show some examples of gas-liquid two phase flow analysis
Characteristics of particle flows,1time,Review characteristics of particle flows
Fundamental aspect of particle flows,1time,Explain variables and parameters subjected to interaction between particle and particle and/or particle and flow. Moreover, momentum and heat exchange between phases, i.e., to explain One-way, Two-way and Four-way coupling numerical methods.
Particle methods,2times,Explain numerical method for thermofluid including static particles like a packed bed. Moreover, numerical methods for macroscopic and microscopic particles such as Discrete Element Method.
Measurements of particle characteristics,2times,Review several measuring methods of particle characteristics and thermofluid behaviors

[Class requirement]

None

Continue to 混相流工学(2)↓↓↓

混相流工学(2)

[Method, Point of view, and Attainment levels of Evaluation]

Present a summary of some papers regarding multiphase flows research by using a power point, and then answer several questions made by lecturers. The quality of your presentation and how deep understand your subject are the grading point.

[Textbook]

Handouts of the presentation will be provided in the lecture.

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	核融合プラズマ工学 Physics of Fusion Plasmas	Affiliated department, Job title,Name	Graduate School of Engineering Professor,MURAKAMI SADAYOSHI

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Wed.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,1time,
,2times,
,2times,
,2times,
,1time,
,1time,
,3times,
,1time,
,1time,
,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	複合加速器工学 Advanced Accelerator Technology	Affiliated department, Job title,Name	Institute for Integrated Radiation and Nuclear Science Associate Professor,YOSHIHIRO ISHI

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Particle accelerator is essential for proceeding nuclear and particle physics but also becomes a very important tool for future nuclear sciences and engineering. In this lecture, a basics theory of accelerator physics including beam optics and dynamics of the circular accelerators is given, and also various applications of the accelerators are also presented.

[Course Goals]

This lecture aims to learn a basic accelerator theory and to attain abilities to make a primitive design of circular accelerator.

[Course Schedule and Contents]

Hisitory and outline of particle accelerator,1time,
Basic theory of beam dynamics in circular accelerator,1time,
Major components of accelerators,1time,
Orbit theories of the beam,3times,
Theory of radio frequency acceleration,2times,
Practice of accelerator designing,2times,
Non linear beam dynamics and others,4times,
Summary and check the accomplishment ,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Reports on practical issues and subjects.

[Textbook]

Not used

[Reference books, etc.]

（Reference books）

S.Y.Lee, Accelerator Physics, World Scientific (1999), J.J.Livingood, Cyclic Particle Accelerator, Van Nostland, New York (1961).E.D. Courant and H.S.Snyder, Ann. Physics, 3,1(1958).

[Regarding studies out of class (preparation and review)]

特になし

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	原子炉安全工学 Nuclear Reactor Safety Engineering	Affiliated department, Job title,Name	Institute for Integrated Radiation and Nuclear Science Professor,NAKAJIMA KEN Institute for Integrated Radiation and Nuclear Science Associate Professor,YAMAMOTO TOSHIHIRO Institute for Integrated Radiation and Nuclear Science Associate Professor,HORI JIYUNICHI

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,1time,
,4times,
,3times,
,5times,
,1time,
,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	応用中性子工学 Applied Neutron Engineering	Affiliated department, Job title,Name	Institute for Integrated Radiation and Nuclear Science Professor,KAWABATA YUUJI Institute for Integrated Radiation and Nuclear Science Associate Professor,HINO MASAHIRO Institute for Integrated Radiation and Nuclear Science Associate Professor,CHATAKE TOSHIYUKI

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Thu.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

, 2 times,
, 2 times,
, 3 times,
, 4 times,
, 3 times,
, 1 times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	放射線医学物理学 Medical Physics	Affiliated department, Job title,Name	Institute for Integrated Radiation and Nuclear Science Associate Professor,SAKURAI YOSHINORI Institute for Integrated Radiation and Nuclear Science Associate Professor,TANAKA HIROKI Institute for Integrated Radiation and Nuclear Science Assistant Professor,TAKATA, Takushi

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Medical physics is the general term for the physics and technology which are supporting radiation diagnosis and therapy, and particle therapy. As it covers many different fields, the important subjects are ldquopromotion for the advance of radiation therapyrdquo and ldquoquality assurance for radiation therapyrdquo. The scope of this course is to learn the fundamental knowledge for radiation medical physics. Especially, the focus is put on the understanding for (1) the bases of physics, biology and so on for radiation, (2) the physics for the radiations applied to diagnosis, (3) the characteristics of radiations and particle beams applied to therapy, and (4) the quality assurance and so on for radiation diagnosis and therapy.

[Course Goals]

To learn the fundamental knowledge of medical physics, mainly for radiation physics in diagnosis and therapy

[Course Schedule and Contents]

Introduction to medical physics for radiation,1time,
Fundamental bilology for radiation,1time,
Radiation measurement and evaluation,2times,
Physics in radiation diagnosis,4times,
Physics in radiation therapy,5times,
Quality assurance and standard dosimetry,1time,
Achievement Assessment,1time,

[Class requirement]

It is recommended to attend the course, ldquoRadiation Measurement for Medicinerdquo, concurrently.

[Method, Point of view, and Attainment levels of Evaluation]

Attendance and reports

[Textbook]

Not specified. Handouts will be given for each topic.

[Reference books, etc.]

（Reference books）

F.M.Khan, ldquoThe Physics of Radiation Therapy: Mechanisms, Diagnosis, and Managementrdquo (Lippincott Williams amp Wilkins, Baltimore, 2003)

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	原子核工学最前線 Nuclear Engineering, Adv.	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,TAISHI KOBAYASHI

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Thu.4	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,1time,
,13times,
,2times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	原子力工学応用実験 Nuclear Engineering Application Experiments	Affiliated department, Job title,Name	Graduate School of Engineering KANKEI KYOIN

Target year		Number of credits	2	Course offered year/period	2019/Year-round
Day/period	Mon.4,5	Class style	Seminar	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,1time,
,10times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	原子核工学序論 1 Introduction to Nuclear Engineering 1	Affiliated department, Job title,Name	Graduate School of Engineering Professor,SASAKI TAKAYUKI

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,7times,
,7times,
,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	原子核工学序論２ Introduction to Nuclear Engineering 2	Affiliated department, Job title,Name	Graduate School of Engineering Professor,SASAKI TAKAYUKI

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Mon.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,4times,
,9times,
,1time,
,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	医学放射線計測学 Radiation Measurement for Medicine	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,TSUCHIDA HIDETSUGU Institute for Integrated Radiation and Nuclear Science Associate Professor,SAKURAI YOSHINORI

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

Fundamentals for Physical Effects of Radiation Interactions,2times,
Fundamentals for Chemical Effects of Radiation Interactions,1time,
Fundamental Quantities and Units for Radiation,2times,
Radiation Measurements in Medical Physics,3times,
Radiation Dosimetry,2times,
Estimation for Dose Distribution,2times,
Techniques for Radiation Control and Measurement in Medical Radiation Field,1time,
Laws and Ordinances for Radiation Therapy,1time,
Check of Study Achievement,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	先端マテリアルサイエンス通論（4回コース） Introduction to Advanced Material Science and Technology (4 times course)	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,YOROZU KAZUAKI Graduate School of Engineering Senior Lecturer,KANEKO KENTAROU

Target year		Number of credits	0.5	Course offered year/period	2019/First semester

Day/period	Fri.5	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

The various technologies used in the field of material science serve as bases for so-called high technologies, and, in turn, the high technologies develop material science. These relate to each other very closely and contribute to the development of modern industries. In this class, recent progresses in material science are briefly introduced, along with selected current topics on new biomaterials, nuclear engineering materials, new metal materials and natural raw materials. The methods of material analysis and future developments in material science are also discussed.

[Course Goals]

To expand your field of vision for material science and to acquire accomplishments to identify the importance of technologies through the classes for developments in material science.

[Course Schedule and Contents]

Topic I Organic Materials
Week 1, Tumor imaging and therapy through photoirradiation
Week 2, Carbon nanorings
Week 3, Synthesis of novel pai-conjugated molecules with main group elements
Week 4, Chemistry of asymmetric catalysis - stereoselective synthesis of opically active pharmaceutical compounds -
Topic II Inorganic Materials
Week 5, Properties of cementitious materials and the future
Week 6, Application of electrical discharge to material and environmental technology
Week 7, Theory of precision cuting, grinding, polishing and related properties of materials
Week 8, Fabrication of inorganic nanofiber by electrospinning
Topic III Polymeric Materials
Week 9-10, Electrical conductivity of conjugated polymers and application to organic Electronics
Week 11-12, An introduction to smart shape changing materials

[Class requirement]

Each topic consists of four lectures.
This course requests to choose one topic from provided three topics in advance.
It is prohibited to change the topic after registration.
We may select students who can attend the class before starting the class.
Students who intend to join the course are required to submit the application form through the web site which will be informed in the advance.

Continue to 先端マテリアルサイエンス通論（4回コース）(2)↓↓↓

先端マテリアルサイエンス通論（4回コース）(2)

[Method, Point of view, and Attainment levels of Evaluation]

The average score of the best two assignments is employed.
For the topic which the students chose, they must attend minimum three lectures and submit minimum two assignments evaluated as "passed".

[Textbook]

Course materials will be provided.

[Reference books, etc.]

（Reference books）

（Related URLs）

http://www.glc.t.kyoto-u.ac.jp/grad(The home page of the engineering education research center)

[Regarding studies out of class (preparation and review)]

This course requests students to prepare a class in advance becouse some classes will be done by an interactive style as necessary.

（Others (office hour, etc.)）

It is prohibited to change the registered course.
It is prohibited to attend the lectures of the other topics than the students chose.
All the students are requested to attend the guidance which will be held on the first class.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	先端マテリアルサイエンス通論（8回コース） Introduction to Advanced Material Science and Technology (8 times course)	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,YOROZU KAZUAKI Graduate School of Engineering Senior Lecturer,KANEKO KENTAROU

Target year		Number of credits	1	Course offered year/period	2019/First semester

Day/period	Fri.5	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

The various technologies used in the field of material science serve as bases for so-called high technologies, and, in turn, the high technologies develop material science. These relate to each other very closely and contribute to the development of modern industries. In this class, recent progresses in material science are briefly introduced, along with selected current topics on new biomaterials, nuclear engineering materials, new metal materials and natural raw materials. The methods of material analysis and future developments in material science are also discussed.

[Course Goals]

To expand your field of vision for material science and to acquire accomplishments to identify the importance of technologies through the classes for developments in material science.

[Course Schedule and Contents]

Topic I Organic Materials
Week 1, Tumor imaging and therapy through photoirradiation
Week 2, Carbon nanorings
Week 3, Synthesis of novel pai-conjugated molecules with main group elements
Week 4, Chemistry of asymmetric catalysis - stereoselective synthesis of opically active pharmaceutical compounds -
Topic II Inorganic Materials
Week 5, Properties of cementitious materials and the future
Week 6, Application of electrical discharge to material and environmental technology
Week 7, Theory of precision cuting, grinding, polishing and related properties of materials
Week 8, Fabrication of inorganic nanofiber by electrospinning
Topic III Polymeric Materials
Week 9-10, Electrical conductivity of conjugated polymers and application to organic Electronics
Week 11-12, An introduction to smart shape changing materials

[Class requirement]

Each topic consists of four lectures.
This course requests to choose two topics from provided three topics in advance.
It is prohibited to change the topics after registration.
We may select students who can attend the class before starting the class.
Students who intend to join the course are required to submit the application form through the web site which will be informed in the advance.

Continue to 先端マテリアルサイエンス通論（8回コース）(2)↓↓↓

先端マテリアルサイエンス通論（8回コース）(2)

[Method, Point of view, and Attainment levels of Evaluation]

The average score of the best two assignments for each topic is employed.
For each topic which the students chose, they must attend minimum three lectures and submit minimum two assignments evaluated as "passed".

[Textbook]

Not used

[Reference books, etc.]

（Reference books）

（Related URLs）

http://www.glc.t.kyoto-u.ac.jp/grad(The home page of the engineering education research center)

[Regarding studies out of class (preparation and review)]

This course requests students to prepare a class in advance becouse some classes will be done by an interactive style as necessary.

（Others (office hour, etc.)）

It is prohibited to change the registered course.
It is prohibited to attend the lectures of the other topic than the students chose.
All the students are requested to attend the guidance which will be held on the first class.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	先端マテリアルサイエンス通論（12回コース） Introduction to Advanced Material Science and Technology (12 times course)	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,YOROZU KAZUAKI Graduate School of Engineering Senior Lecturer,KANEKO KENTAROU

Target year		Number of credits	1.5	Course offered year/period	2019/First semester

Day/period	Fri.5	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

The various technologies used in the field of material science serve as bases for so-called high technologies, and, in turn, the high technologies develop material science. These relate to each other very closely and contribute to the development of modern industries. In this class, recent progresses in material science are briefly introduced, along with selected current topics on new biomaterials, nuclear engineering materials, new metal materials and natural raw materials. The methods of material analysis and future developments in material science are also discussed.

[Course Goals]

To expand your field of vision for material science and to acquire accomplishments to identify the importance of technologies through the classes for developments in material science.

[Course Schedule and Contents]

Topic I Organic Materials
Week 1, Tumor imaging and therapy through photoirradiation
Week 2, Carbon nanorings
Week 3, Synthesis of novel pai-conjugated molecules with main group elements
Week 4, Chemistry of asymmetric catalysis - stereoselective synthesis of opically active pharmaceutical compounds -
Topic II Inorganic Materials
Week 5, Properties of cementitious materials and the future
Week 6, Application of electrical discharge to material and environmental technology
Week 7, Theory of precision cuting, grinding, polishing and related properties of materials
Week 8, Fabrication of inorganic nanofiber by electrospinning
Topic III Polymeric Materials
Week 9-10, Electrical conductivity of conjugated polymers and application to organic Electronics
Week 11-12, An introduction to smart shape changing materials

[Class requirement]

Each topic consists of four lectures.
This course requests to take all provided three topics.
We may select students who can attend the class before starting the class.
Students who intend to join the course are required to submit the application form through the web site which will be informed in the advance.

[Method, Point of view, and Attainment levels of Evaluation]

The average score of the best two assignments for each topics is employed.
For each topic, the students must attend minimum three lectures and submit minimum two assignments

Continue to 先端マテリアルサイエンス通論（12回コース）(2)↓↓↓

evaluated as "passed".

[Textbook]

Not used

[Reference books, etc.]

（Reference books）

（Related URLs）

http://www.glc.t.kyoto-u.ac.jp/grad(The home page of the engineering education research center)

[Regarding studies out of class (preparation and review)]

This course requests students to prepare a class in advance becouse some classes will be done by an interactive style as necessary.

（Others (office hour, etc.)）

It is prohibited to change the registered course.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	現代科学技術特論（4回コース） Advanced Modern Science and Technology (4 times course)	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,ASHIDA RIYUUICHI Graduate School of Engineering Senior Lecturer,MATSUMOTO RIYOUSUKE Graduate School of Engineering Senior Lecturer,MAEDA MASAHIRO Graduate School of Engineering Senior Lecturer,YOROZU KAZUAKI Graduate School of Engineering Senior Lecturer,KANEKO KENTAROU

Target year		Number of credits	0.5	Course offered year/period	2019/Second semester
Day/period	Thu.5	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Engineering/Engineers have been expected to fulfill key roles among social issues and others, such as energy, environment and resource. This class introduces cutting edge science and technologies from their backgrounds, research and development, to problems for the practical applications. Group discussions will be done for further understanding of the topics of the course.

[Course Goals]

The students understand of each technology towards social issues to be solved by engineers. In addition, the students learn the importance for engineers to have multidisciplinary mind and understand the significance of engineering to realize sustainable development.

[Course Schedule and Contents]

Topic I Computer-Aided Analyses for Fluid
Week 1-2, Lagrangian Meshfree Methods as New Generation Computational Tools
Week 3, CFD in Process Systems Engineering
Week 4, CFD in Hydraulic Engineering
Topic II Utilization of Light Energy
Week 5-6, Photochemistry of Organic Molecules
Week 7, Solar Energy Conversion Using Semiconductor Photocatalysts
Week 8, Efficiency Improvement in Solar Cells by Photonic Nano Structures
Topic III Materials Analysis
Week 9-10,Crystal Structure Analysis by Power X-ray Diffraction Measurement
Week 11-12, Principles and Applications of Fluorescence Spectroscopy

[Class requirement]

Each topic consists of four lectures.
This course requests to choose one topic from provided three topics in advance.
It is prohibited to change the topic after registration.

[Method, Point of view, and Attainment levels of Evaluation]

The average score of the best two assignments is employed.
For the topic which the students chose, they must attend minimum three lectures and submit minimum two assignments evaluated as "passed".

Continue to 現代科学技術特論（4回コース）(2)↓↓↓

現代科学技術特論（4回コース）(2)

[Textbook]

Course materials will be provided.

[Reference books, etc.]

（Reference books）

（Related URLs）

http://www.glc.t.kyoto-u.ac.jp/grad(The home page of the engineering education research center)

[Regarding studies out of class (preparation and review)]

This course requests students to prepare a class in advance becouse some classes will be done by an interactive style as necessary.

（Others (office hour, etc.)）

It is prohibited to change the registered course.
It is prohibited to attend the lectures of the other topics than the students chose.
All the students are requested to attend the guidance which will be held on the first class.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	現代科学技術特論（8回コース） Advanced Modern Science and Technology (8 times course)	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,ASHIDA RIYUUICHI Graduate School of Engineering Senior Lecturer,MATSUMOTO RIYOUSUKE Graduate School of Engineering Senior Lecturer,MAEDA MASAHIRO Graduate School of Engineering Senior Lecturer,YOROZU KAZUAKI Graduate School of Engineering Senior Lecturer,KANEKO KENTAROU

Target year		Number of credits	1	Course offered year/period	2019/Second semester
Day/period	Thu.5	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Engineering/Engineers have been expected to fulfill key roles among social issues and others, such as energy, environment and resource. This class introduces cutting edge science and technologies from their backgrounds, research and development, to problems for the practical applications. Group discussions will be done for further understanding of the topics of the course.

[Course Goals]

The students understand of each technology towards social issues to be solved by engineers. In addition, the students learn the importance for engineers to have multidisciplinary mind and understand the significance of engineering to realize sustainable development.

[Course Schedule and Contents]

Topic I Computer-Aided Analyses for Fluid
Week 1-2, Lagrangian Meshfree Methods as New Generation Computational Tools
Week 3, CFD in Process Systems Engineering
Week 4, CFD in Hydraulic Engineering
Topic II Utilization of Light Energy
Week 5-6, Photochemistry of Organic Molecules
Week 7, Solar Energy Conversion Using Semiconductor Photocatalysts
Week 8, Efficiency Improvement in Solar Cells by Photonic Nano Structures
Topic III Materials Analysis
Week 9-10,Crystal Structure Analysis by Power X-ray Diffraction Measurement
Week 11-12, Principles and Applications of Fluorescence Spectroscopy

[Class requirement]

Each topic consists of four lectures.
This course requests to choose two topics from provided three topics in advance.
It is prohibited to change the topics after registration.

[Method, Point of view, and Attainment levels of Evaluation]

The average score of the best two assignments for each topic is employed.
For each topic which the students chose, they must attend minimum three lectures and submit minimum two assignments evaluated as "passed".

Continue to 現代科学技術特論（8回コース）(2)↓↓↓

現代科学技術特論（8回コース）(2)

[Textbook]

Course materials will be provided.

[Reference books, etc.]

（Reference books）

（Related URLs）

http://www.glc.t.kyoto-u.ac.jp/grad(The home page of the engineering education research center)

[Regarding studies out of class (preparation and review)]

This course requests students to prepare a class in advance becouse some classes will be done by an interactive style as necessary.

（Others (office hour, etc.)）

It is prohibited to change the registered course.
It is prohibited to attend the lectures of the other topic than the students chose.
All the students are requested to attend the guidance which will be held on the first class.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	現代科学技術特論（12回コース） Advanced Modern Science and Technology (12 times course)	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,ASHIDA RIYUUICHI Graduate School of Engineering Senior Lecturer,MATSUMOTO RIYOUSUKE Graduate School of Engineering Senior Lecturer,MAEDA MASAHIRO Graduate School of Engineering Senior Lecturer,YOROZU KAZUAKI Graduate School of Engineering Senior Lecturer,KANEKO KENTAROU

Target year		Number of credits	1.5	Course offered year/period	2019/Second semester
Day/period	Thu.5	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Engineering/Engineers have been expected to fulfill key roles among social issues and others, such as energy, environment and resource. This class introduces cutting edge science and technologies from their backgrounds, research and development, to problems for the practical applications. Group discussions will be done for further understanding of the topics of the course.

[Course Goals]

The students understand of each technology towards social issues to be solved by engineers. In addition, the students learn the importance for engineers to have multidisciplinary mind and understand the significance of engineering to realize sustainable development.

[Course Schedule and Contents]

Topic I Computer-Aided Analyses for Fluid
Week 1-2, Lagrangian Meshfree Methods as New Generation Computational Tools
Week 3, CFD in Process Systems Engineering
Week 4, CFD in Hydraulic Engineering
Topic II Utilization of Light Energy
Week 5-6, Photochemistry of Organic Molecules
Week 7, Solar Energy Conversion Using Semiconductor Photocatalysts
Week 8, Efficiency Improvement in Solar Cells by Photonic Nano Structures
Topic III Materials Analysis
Week 9-10,Crystal Structure Analysis by Power X-ray Diffraction Measurement
Week 11-12, Principles and Applications of Fluorescence Spectroscopy

[Class requirement]

Each topic consists of four lectures.
This course requests to take all provided three topics.

Continue to 現代科学技術特論（12回コース）(2)↓↓↓

現代科学技術特論（12回コース）(2)

[Method, Point of view, and Attainment levels of Evaluation]

The average score of the best two assignments for each topics is employed.
For each topic, the students must attend minimum three lectures and submit minimum two assignments evaluated as "passed".

[Textbook]

Course materials will be provided.

[Reference books, etc.]

（Reference books）

（Related URLs）

http://www.glc.t.kyoto-u.ac.jp/grad(The home page of the engineering education research center)

[Regarding studies out of class (preparation and review)]

This course requests students to prepare a class in advance becouse some classes will be done by an interactive style as necessary.

（Others (office hour, etc.)）

It is prohibited to change the registered course.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	実践的科学英語演習 II Exercise in Practical Scientific English II	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,NISHIKAWA MIKAKO Graduate School of Engineering Associate Professor,Juha Lintuluoto Graduate School of Engineering Senior Lecturer,BEAUCAMP, Anthony Tadeus Herve Graduate School of Engineering Associate Professor,Cedric Tassel Graduate School of Engineering Senior Lecturer,LANDENBERGER, Kira Beth Graduate School of Engineering Senior Lecturer,DE ZOYSA, Menaka

Target year		Number of credits	1	Course offered year/period	2019/Second semester
Day/period	Mon.5	Class style	Seminar	Language	English

[Outline and Purpose of the Course]

This course is open to all master and doctoral engineering students.

The aim is to enhance students' abilities to disseminate scientific findings to a wider audience in English.

Throughout the course, feedback will be given to the presenter by different instructors specialized in Engineering.

The course will help students gain confidence in Oral English presentations on scientific topics.

[Course Goals]

Throughout the course, students are expected to deliver an oral presentation about their research three times.

In each class, four or five students (depending on the total number of students in the class) will deliver an oral presentation (15 min) using the visual aid in front of a small group.

After each presentation, the audience, and the instructor(s) in the class will give some meaningful feedback (5 min).

In addition, each presentation will be videotaped. Students can monitor the progress by watching own video and can write a reflection paper at the end of the course.

In addition, we will have poster presentations scheduled at the end of the course.

[Course Schedule and Contents]

The course is constituted of three main parts:

Part 1. Introduction to Effective Presentation
A lecture is given on how to prepare an effective presentation including:
1. Presenting with purpose, 2. How to organize your message, 3. How to use transitional words and phrases, and 4. What to do for Questions and Answers.

Continue to 実践的科学英語演習 II (2)↓↓↓

実践的科学英語演習 II (2)

Part 2. Oral presentation (12 classes)
Here are some focal points for each round of oral presentations: 1. Organization: Presentation should be structurally organized and contains information in a logical, interesting sequence which audience can follow, 2. Subject Knowledge: Students should be able to demonstrate the knowledge on the research topic with some degree of confidence, 3. Delivery: Students should be able to deliver a presentation that will merit the audience even if the audience does not come from the same research field.

Part 3. Poster presentation (2 classes)
Here are some criteria for poster presentations: 1. The layout of the information: The sequence of information should be logically organized and easy to follow, 2. A scientific knowledge: The poster should provide content suitable for non-experts, 3. Delivery: Students need to demonstrate knowledge and enthusiasm for their work.

[Class requirement]

This course is held in English. Students are expected to actively engage in class discussions.

[Method, Point of view, and Attainment levels of Evaluation]

Evaluation:
20% participation (engaging the Q&As)
10% reflection paper,
10% poster presentation,
60% oral presentations

[Textbook]

Handout materials will be supplied by the instructor.

[Reference books, etc.]

（Reference books）

Donovan, J. (2014). How to deliver a TED talk. Mc Graw, Hill Education.

（Related URLs）

(None)

[Regarding studies out of class (preparation and review)]

The digital syllabus contains schedule updates, useful tips, and materials (videos). The links to the digital syllabus will be notified during the first day of the course.

（Others (office hour, etc.)）

Students who intend to join this course must attend the first class.

Office Hours: (by appointment) nishikawa.mikako7w@kyoto-u.ac.jp (Ext. 2052)

Continue to 実践的科学英語演習 II (3)↓↓↓

実践的科学英語演習 II (3)

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	安全衛生工学（4回コース） Safety and Health Engineering (4 times course)	Affiliated department, Job title,Name	Agency for Health, Safety and Environment Professor,HASHIMOTO SATOSHI Agency for Health, Safety and Environment Associate Professor,MATSUI YASUTO

Target year		Number of credits	0.5	Course offered year/period	2019/First semester

Day/period	Tue.4	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,1time,
,1time,
,1time,
,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	インターンシップM（原子核） Engineering Internship M	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,MAJIMA TAKUYA

Target year		Number of credits	2	Course offered year/period	2019/Intensive, Second semester
Day/period	Intensive	Class style	Practical training	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	工学研究科国際インターンシップ２ International Internship in Engineering 2	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,NISHIKAWA MIKAKO

Target year		Number of credits	2	Course offered year/period	2019/Intensive, year-round

Day/period	Intensive	Class style	Practical training	Language	English

[Outline and Purpose of the Course]

Acquisition of international skills with the training of foreign language through the internship programs hosted by the University, the Graduate School of Engineering, or The Department the registrant belongs to.

[Course Goals]

Acquisition of international skills with the training of foreign language. Detailed objectives should be described in each program.

[Course Schedule and Contents]

Overseas Internship, **1** times,The contents to be acquired should be described in the brochure of each internship program.
Final Presentation, **1** times,A presentation by the student is required followed by discussion among participants.

[Class requirement]

Described in the application booklet for each internship program. The registrant is requested to have enough language skills for the participation.

[Method, Point of view, and Attainment levels of Evaluation]

Merit rating is performed based on the presentation or the report(s) after the participation in each internship program. Each department is responsible to identify the number of credits to be granted to the student of the department, if the credits are included in the mandatory ones. The Global Leadership Engineering Education Center takes the role to evaluate the credits if the department the student belongs to deals the credits as optional ones. The number of credits to be earned is 1 and 2, respectively to the subjects International Internship in Engineering 1 and 2 depending on the period and the contents of the internship program the students has participated in.

[Textbook]

Not Applicable.

Continue to 工学研究科国際インターンシップ２(2)↓↓↓

工学研究科国際インターンシップ２(2)

[Reference books, etc.]

（Reference books）

Not Applicable.

（Related URLs）

(Not Applicable.)

[Regarding studies out of class (preparation and review)]

Not Applicable.

（Others (office hour, etc.)）

It is required for students to check if the internship program to participate in could be evaluated as part of mandatory credits or not and could earn how many credits before the participation to the department or educational program the student in enrolled. If the credit could not be treated as mandatory ones, get in touch with the Global Leadership Engineering Education Center.

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	原子核工学特別実験及演習第一 Experiments and Exercises on Nuclear Engineering, Adv.I	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KANNO IKUO Graduate School of Engineering Associate Professor,MAJIMA TAKUYA

Target year		Number of credits	4	Course offered year/period	2019/Intensive, year-round
Day/period	Intensive	Class style	Experiment	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,4times,
,6times,
,10times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	原子核工学特別実験及演習第二 Experiments and Exercises on Nuclear Engineering, Adv.II	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KANNO IKUO Graduate School of Engineering Associate Professor,MAJIMA TAKUYA

Target year		Number of credits	4	Course offered year/period	2019/Intensive, year-round

Day/period	Intensive	Class style	Experiment	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,4times,
,6times,
,10times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	原子核工学セミナーA Seminar on Nuclear Engineering A, B	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KANNO IKUO Graduate School of Engineering Associate Professor,MAJIMA TAKUYA

Target year		Number of credits	1	Course offered year/period	2019/Intensive, First semester

Day/period	Intensive	Class style	Seminar	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,1time,
,2times,
,10times,
,2times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	原子核工学セミナーB Seminar on Nuclear Engineering A, B	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KANNO IKUO Graduate School of Engineering Associate Professor,MAJIMA TAKUYA

Target year		Number of credits	1	Course offered year/period	2019/Second semester

Day/period	Wed.5	Class style	Seminar	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,1time,
,2times,
,10times,
,2times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code	G-LAS00 80001 LJ20		
Course title <English>	研究倫理・研究公正（理工系） Research Ethics and Integrity(Science and Technology)	Affiliated department, Job title,Name	Institute for Liberal Arts and Sciences Program-Specific Professor,ITO SHINZABUROU Institute for Liberal Arts and Sciences Program-Specific Professor,SATOU TOORU Graduate School of Engineering Professor,KAWAKAMI YOUICHI

Group	Common Graduate Courses	Field(Classification)	Social Responsibility and Profitability

Language	Japanese	Old group		Number of credits	0.5

Hours	7.5	Class style	Lecture	Course offered year/period	2019・ Intensive, First semester

Day/period	Intensive	Target year	Graduate students	Eligible students	For science students

[Outline and Purpose of the Course]

研究をこれから始める大学院生に責任ある行動をする研究者として身につけておくべき心構えを講述する。研究者としての規範を保っていかに研究を進めるか、また研究成果の適切な発表方法など、研究倫理・研究公正についてさまざまな例を示しながら、科学研究における不正行為がいかに健全な科学の発展の妨げになるか、またデータの正しい取扱いや誠実な研究態度、発表の仕方が、自らの立場を守るためにもいかに重要かを講義する。さらに、研究費の適切な使用と知的財産や利益相反について学ぶ。講義に続いてグループワークを行い、与えられた仮想課題を自らの問題として考え、解決方法のディスカッションを行う。

[Course Goals]

第１講～第４講を通じて、研究者としての責任ある行動とは何かを修得する。科学研究における不正行為の事例学習、討論を通じて、誠実な研究活動を遂行する研究者の心得を身につけ、最後に研究倫理・研究公正についてのe-ラーニングコースを受講し、理解度を確認する。

[Course Schedule and Contents)]

第１講　科学研究における心構え－研究者の責任ある行動とは－
１．研究者の責任ある行動とは（学術活動に参加する者としての義務）
２．不正の可能性と対応
３．実験室の安全対策と環境への配慮
４．データの収集と管理－実験データの正しい取扱い方－
５．科学上の間違いと手抜き行為の戒め
６．誠実な研究活動中の間違いとの区別
７．科学研究における不正行為
第２講　研究成果を発表する際の研究倫理公正
１．研究成果の共有
２．論文発表の方法とプロセス
３．科学研究における不正行為（典型的な不正）
４．データの取扱い（データの保存・公開・機密）
５．その他の逸脱行為（好ましくない研究行為）
６．研究不正事件（シェーン捏造事件）
７．不適切な発表方法（オーサーシップ、二重投稿）
第３講　知的財産と研究費の適正使用
１．知的財産の考え方（知的財産の確保と研究発表）
２．研究資金と契約

Continue to 研究倫理・研究公正（理工系）(2)↓↓↓

研究倫理・研究公正（理工系）(2)

３．利益相反（利害の衝突と回避）
４．公的研究費の適切な取扱い
５．研究者・研究機関へのペナルティー
６．事例紹介（ビデオ：分野共通４件）
７．結語
第４講　グループワーク
１．例示された課題についてグループ・ディスカッションと発表
２．日本学術振興会「研究倫理ラーニングコース」の受講と修了証書の提出

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

第１～４講の全てに出席と参加の状況、ならびに学術振興会e-learningの修了証の提出をもって合格を判定する。

[Textbook]

日本学術振興会「科学の健全な発展のために」編集委員会 『科学の健全な発展のために－ 誠実な科学者の心得－』（丸善出版）ISBN:978-4621089149（学術振興会のHP（https://www.jsps.go.jp/j-kousei/data/rinri.pdf）より、テキスト版をダウンロード可能）

[Reference book, etc.]

（Reference book）
米国科学アカデミー 編、池内 了 訳 『科学者をめざす君たちへ―研究者の責任ある行動とは』（化学同人）ISBN:978-4759814286
眞嶋俊造、奥田太郎、河野哲也編著 『人文・社会科学のための研究倫理ガイドブック』（慶応義塾大学出版会）ISBN:978-4766422559
神里彩子、武藤香織編 『医学・生命科学の研究倫理ハンドブック』（東京大学出版会）ISBN:978-4130624138
野島高彦著 『誰も教えてくれなかった実験ノートの書き方』（化学同人）ISBN:978-4759819335
須田桃子著 『捏造の科学者 STAP細胞事件』（文藝春秋）ISBN:978-4163901916

[Regarding studies out of class (preparation and review)]

日本学術振興会「研究倫理ラーニングコース」の受講

[Others (office hour, etc.)]

第１～３講は土曜２，３，４限に行う。第４講はグループワークを中心として講義の翌週または翌々週の土曜１，２または３，４限に実施する。

Numbering code	G-INF01 53154 LJ10　G-INF01 53154 LJ12　G-INF01 53154 LJ11

Course title <English>	情報科学基礎論 Introduction to Information Science	Affiliated department, Job title,Name	Graduate School of Informatics Professor,YAMAMOTO AKIHIRO Graduate School of Informatics Professor,KASHIMA HISASHI Graduate School of Informatics Professor,NISHIDA TOYOAKI Graduate School of Informatics Professor,KUROHASHI SADAO Graduate School of Informatics Professor,KAWAHARA TATSUYA Graduate School of Informatics Professor,NISHINO KO Academic Center for Computing and Media Studies Professor,OKABE YASUO Academic Center for Computing and Media Studies Professor,MORI SHINSUKE

Target year	1st year students or above	Number of credits	2	Course offered year/period	2019/First semester

Day/period	Tue.4	Class style	Lecture	Language	Japanese

Class type	専攻基礎科目

[Outline and Purpose of the Course]

高度情報化社会である今日，至るところに蓄積される大量のデータを解析するための科学であるデータ科学は，学術全般・産業界のみならず日常生活の至る所に大きな変化をもたらそうとしている．データ科学の根幹である情報学・統計学・数理科学に対する基本的な理解，特に情報科学に関する基礎的知識は社会を支える広範な人材にとっての基礎的な教養である．本講義は，情報系・電気電子系学科以外の出身者が，情報科学に関する基礎的内容を修得することを目的とする．

[Course Goals]

情報系・電気電子系学科以外の出身者が，大学院での学修の基礎として，あるいは現代社会を支える人材として求められる素養としての情報科学に関する基礎的知識を修得する．

[Course Schedule and Contents]

1. 計算機工学: ビット列によるデータ表現, 論理演算子と電子回路による実現, 組み合わせ論理回路と順序回路, 基本演算回路, 計算機アーキテクチャ
2. アルゴリズムとデータ構造: さまざまなデータ構造と探索アルゴリズム
3. 形式言語理論とオートマトン: 言語の形式的定義と形式文法, 正規文法と有限オートマトン, 文脈自由文法
4. パターン認識: パターン情報処理, ベイズ決定, 識別関数
5. 情報理論: 情報メディアの構造, シャノンの情報理論, 情報の表現・ディジタル化・符号化
6. コンピュータネットワーク: インターネットとは, ネットワークの階層モデル, IP と経路制御プロトコル, TCP における輻輳制御
7. 推論とプログラム: 推論の形式化, プログラムの理論
8. 人工知能基礎: 人工知能研究の歴史と発見的探索, 機械学習とデータマイニング入門

当該年度の授業回数などに応じて一部省略，追加がありうる．

Continue to 情報科学基礎論(2)↓↓↓

情報科学基礎論(2)

[Class requirement]

本講義は，情報系・電気電子系学科以外の出身者を対象とした学部専門科目の概要紹介であるので，これらの学科の出身者は，本講義の単位を修得することはできない．もちろん，本講義の全部あるいは一部を聴講することは可能である．

[Method, Point of view, and Attainment levels of Evaluation]

各単元において出題するレポートにより情報学研究科成績評価規定第７条により評価する．試験を行うこともある．情報系・電気電子系学科の学部の講義内容を修得することを目標とする．

[Textbook]

Not used

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

各単元において出題されるレポート課題に取り組むとともに，講義内容やそれに関連する内容について各自予習復習を行うこと．

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.