Tokyo Tech
Energy Course

Orientation for Energy Science and Engineering New Students

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Outline

- Opening
- Requirements for acquiring doctoral/master's degrees
- Information for new students

HOMEPAGE

www.energy.titech.ac.jp

PDF files are available.

1. English version of a PowerPoint file in last September.
2. Japanese version of a PowerPoint file in last April.

This file will be uploaded soon.

Tokyo Tech
Energy Course

Introduction of Energy Science and Engineering Course

Tokyo Tech Energy Course

Energy Course has faculty in six different departments.

化学系

School of Science
Department of Chemistry

材料系・応用化学系

School of Material and Chemical Technology
Department of Materials Science and Engineering
Department of Chemical Science and Engineering

School of Engineering
Department of Mechanical Engineering
Department of Electrical and Electronics Engineering

機械系・電気電子系

School of Environment and Society
Department of Transdisciplinary Science and Engineering

融合理工学系

Energy Course

Master course students: ca. 160
Doctor course students: ca. 40

エネルギーコース

・Energy related various lectures
fundamental knowledge on Energy

・Specialist
advanced expertise based on the disciplines

5 facts in EC

・Global views
International

・Cooperation with industry
Practice Based Education

・Professors with various backgro
Interdisciplinary

The program combines fundamental energy theory based coursework, career development courses, off-campus internships and thesis research to educate global engineers and scientists. In the various energy related fields, there is overlap or shared core knowledge in research, technology and policy. Developing a birds-eye view of the various energy fields is needed by tomorrow's energy leaders to solve global energy problems.

Development of education and research in energy in Tokyo Tech

Tokyo Tech Energy Course

2016-
Energy Course

2015-
Global hydrogen energy research unit

2013-
Smart Energy system in the EEI
Demonstration-ENE-Swallow, ver.3

2012
EEI: Environmental energy innovation Building

2011-2018
ACEEES: Academy for co-creative education of Envir. and Energy Sys.

visit:
http://www.energy.titech.ac.jp

2010-
AES Center

2009
Trans-faculty
Organization of Energy and Environment

2008－2013
Global COE program
「multidimensional energy theory」

Tokyo Tech Energy Course

www.energy.titech.ac.jp

- Objectives
- Departments
- Academics
- Curriculum
- Faculty Members
- Student Voices
- Job Prospects
- Research labs
- Videos
- Links

WHAT'S ENERGY COURSE?

more info

The Tokyo Tech Energy Science and Engineering Graduate Major (abbreviated Energy Course) is a new degree program for master and doctoral students. The program combines fundamental energy theory based coursework, career development courses, off-campus internships and thesis research to educate global engineers and scientists. Students developed a bird's eye view of energy related fields, based upon shared core knowledge related to research, technology and policy.

INFORMATION

to LIST

NEWS 2020.09.30

2020 September New Student orientation

Facebookを検索

ホーム

荒井 創

Tokyo Tech Energy Course

Tokyo Tech Energy Course

@tokyotechenergy · 大学

メッセージを送信

ホーム　基本データ　レビュー　写真　その他

いいね！

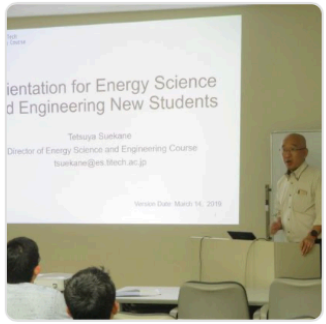
アルバム

すべて表示

カバー写真
アイテム5件

タイムラインの写真
アイテム49件

Energy Course Student Research Presentation
アイテム10件



Sept. 2019 Orientation
アイテム4件

東京工業大学
エネルギーコース

Philosophy and Goal of Energy Science and Engineering Course

A first class of master course graduate in spring, 2018

●Philosophy and Goal of Energy Science and Engineering Course

Energy-related research and economic development has grown world-wide and become an important issue for society. Accordingly, there is a greater need to develop this interdisciplinary academic field into "multidimensional energy theory" to fuse/reconstruct energy-related academics, enable a comprehensive view and realize efficient utilization of energy knowledge. It is also necessary to cultivate professionals and leaders who have acquired expertise in multidimensional energy theory.

In the Graduate Majors in Energy Science and Engineering, we cultivate individuals to lead innovation and contribute to society with advanced expertise based on the disciplines of physics, chemistry, materials science, mechanical engineering, and electrical engineering. Such individuals possess the comprehensive skills to handle ever-changing energy problems from a multidimensional energy theory perspective, with independent problem development/solving skills and international leadership skills.

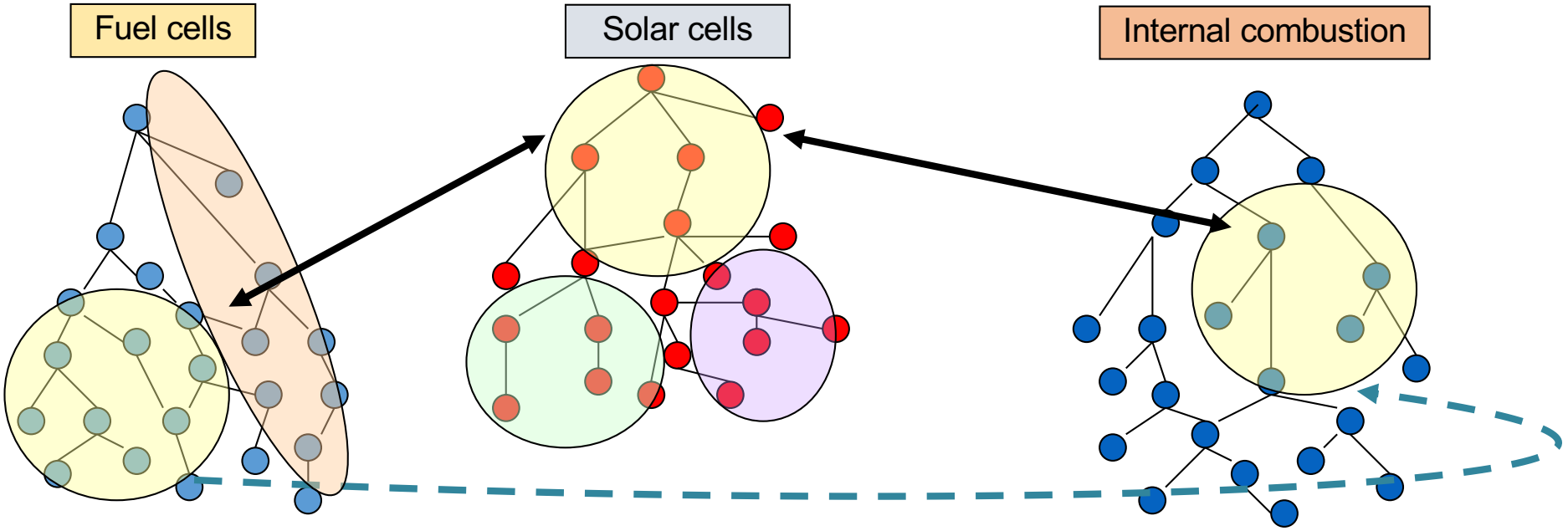
How can professionals acquire theory shared by different energy fields while maintaining expertise in the basics of each discipline?

What is multidimensional energy theory and how does it contribute to achieving this goal?

Shared theory taught in Energy related courses "multidimensional energy theory" —Reorganization of energy knowledge—

- Energy principles consist of knowledge nodes spanning different fields (academic majors)

Tremendous amount of knowledge in different fields makes it difficult to ascertain comprehensive knowledge from a bird's viewpoint



Classification (reorganization)

through analogy with knowledge fields

What is the same? What is different?

Deep understanding necessary to have a comprehensive view of energy knowledge

Utilization of Knowledge necessary for advanced research

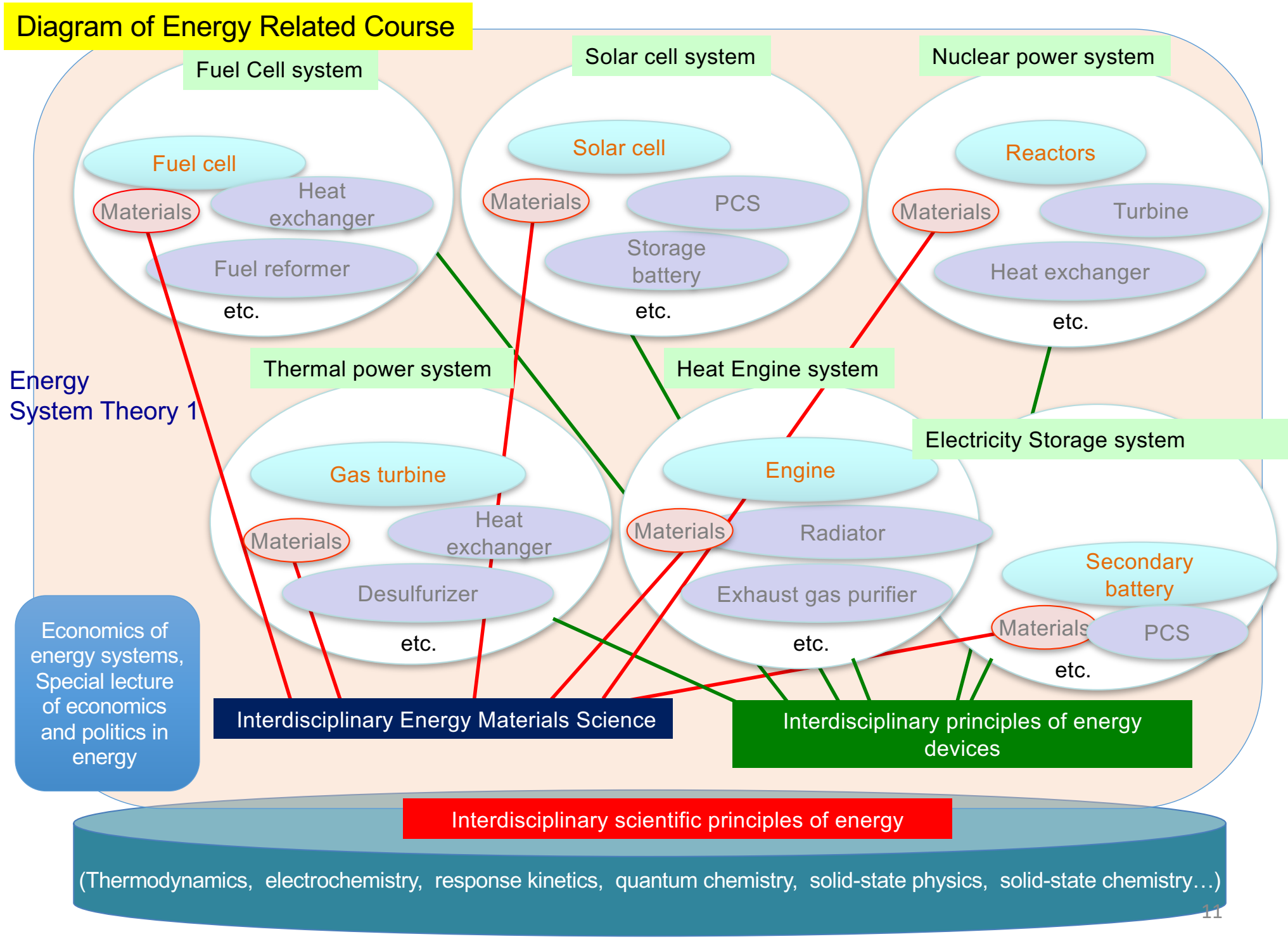
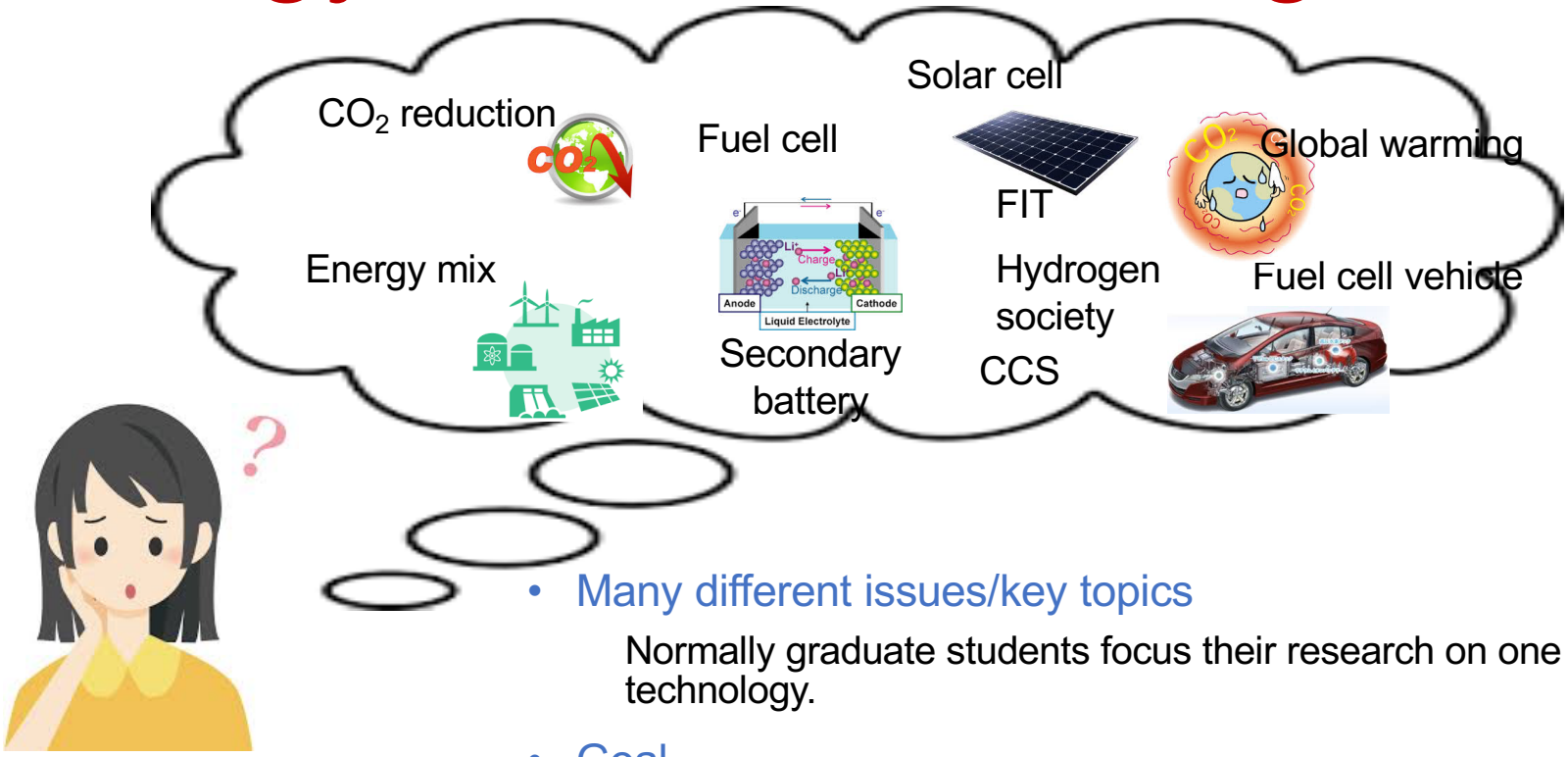


Diagram of Energy Related Course
Fuel Cell system
Fuel cell
Materials
Heat exchanger
Fuel reformer
etc.
Solar cell system
Solar cell
Materials
PCS
Storage battery
etc.
Nuclear power system
Reactors
Materials
Turbine
Heat exchanger
etc.
Energy System Theory 1
Thermal power system
Gas turbine
Materials
Heat exchanger
Desulfurizer
etc.
Heat Engine system
Engine
Materials
Radiator
Exhaust gas purifier
etc.
Electricity Storage system
Secondary battery
Materials
PCS
etc.
Economics of energy systems, Special lecture of economics and politics in energy
Interdisciplinary Energy Materials Science
Interdisciplinary principles of energy devices
Interdisciplinary scientific principles of energy
(Thermodynamics, electrochemistry, response kinetics, quantum chemistry, solid-state physics, solid-state chemistry…)

Energy Science and Engineering



- Many different issues/key topics

  Normally graduate students focus their research on one single topic or technology.

- Goal
  - Cultivate professionals who are highly committed to contributing to society and who are capable of leading innovation
    - Advanced expertise in the energy field based on the disciplines of physics, chemistry, materials science, mechanical engineering, and electrical engineering
    - Possess the comprehensive skills to handle ever-changing energy problems from a multidimensional energy theory perspective
    - Independent problem development/solving skills
    - International leadership skills

東京工業大学
エネルギーコース

6 Departments with energy course

Department	Representative	
Chemistry	Nobuya KOSHIHARA	
Mechanical Engineering	Katsunori HANAMURA	
Electrical and Electronic Engineering	Akira YAMADA	
Materials Science and Engineering	Masahiro MIYAUCHI	
Chemical Science and Engineering	Hajime ARAI	Course director
Transdisciplinary Science and Engineering	Daisuke AKITA	

+1-2 member(s) of board of education in each department

Curriculum for Energy Science and Engineering

Master’s Program

Requirements for Master's Program of Energy Science and Engineering

Course classification		Required credits	Elective credits	No. of credits	Relation with studied content
Liberal Arts and Basic Science Courses	Humanities and social science courses		・At least 2 from 400-levels ・At least 1 credit from 500-levels	At least 5 credits	D
	Career development courses		・At least 2 credits from 400 and 500-levels		C, D, E
	Other				
Core courses	Research Seminars	Two credits from each of the following: Seminar in Energy Science S1 Seminar in Energy Science F1 Seminar in Energy Science S2 Seminar in Energy Science F2 Total of 8 credits		At least 25 credits from specialized courses of the standard learning curriculum	B, C, D, E
	Research related courses				B, C, D, E
	Major courses		・At least 4 credits from Interdisciplinary Scientific Principles of Energy Courses and ・At least 4 credits from energy course in student's affiliated department See course notes		A, B
	Core courses other than the standard learning curriculum or research related courses				
Total credits for graduation		The student must meet the requirements listed above and obtain at least 30 credits			

Requirements for Mas

Some credits of Japanese Language and Culture Course are transferred to credits of Liberal Arts.
But Not ENGLISH!!!

You should satisfy not only number of credits but also GA!!!!

Course classification		Re			
Liberal Arts and Basic Science Courses	Humanities and social science courses		・At least 2 from 400-levels ・At least 1 credit from 500-levels	At least 5 credits	D
	Career development courses		・At least 2 credits from 400 and 500-levels		C, D, E
	Other				
Core courses	Research Seminars	Two credits from ... following Seminar Seminar Seminar Seminar Total of			
	Research related courses				
	Major courses		・At least 4 credits from Interdisciplinary Scientific Principles of Energy Courses and ・At least 4 credits from energy course in student's affiliated department See course notes	courses of the standard learning curriculum	A, B
	Core courses other than the standard learning curriculum or research related courses				
Total credits for graduation		The student must meet the requirements listed above and obtain at least 30 credits			

Course Key Features

- Energy Interdisciplinary Principle Courses
  - Courses for learning energy principals (multidimensional energy theory) which is shared among energy fields
- Major related courses
  - Lectures on advanced topics based the following disciplines: physics, chemistry, materials science, mechanical engineering, or electrical engineering
  - XX section of Energy Science and Engineering in the XX field
- Research Seminars
  - Seminars, subscription to academic papers, etc.

Energy Interdisciplinary Principle Courses

Major Related Courses

Research Seminars

Number of credits which must be taken from the Core Courses (at least 25 credits)

The remaining 9 credits are taken from the following (more than 200 courses)

Energy Interdisciplinary Principle Courses
- Required (4 credits selected from among 8 credits)
- Electives
  - Opening of Energy Science and Engineering
  - Opening of Global Engineering for Development, Environment and Society

Major Related Courses (total of about 200 courses)
- Major Courses in student's affiliated department (4 credits)
- Major Courses of other departments

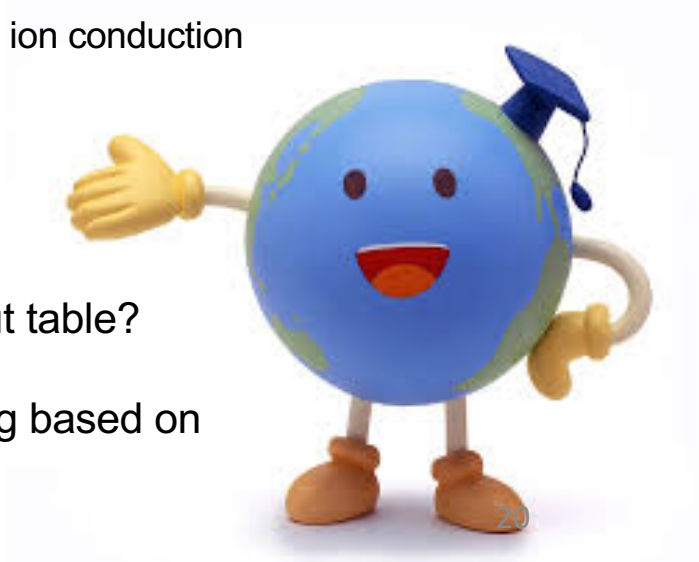
Research Seminars (8 credits)

(minimum requirements)

Note also to take humanities and social science course (3 or more credits) and career development course (both C0M and C1M).
The orientation information for humanities and social science course will be provided;
http://bunkei.ila.titech.ac.jp/

Overview of Interdisciplinary Energy Courses (at least 4 credits required)

- Interdisciplinary scientific principles of energy 1, 2
  - Basics are applied, but application is not applied.
    - (1) Learning for thermodynamics and quantum mechanics
    - (2) Mass transfer, lattice oscillation; optical properties of energy and materials
- Interdisciplinary principles of energy devices 1, 2
  - (1) Devices focusing on heat
    - Heat engine, nuclear power, heat pumps, electrical devices
  - (2) Devices focusing on light and electrochemistry
    - Fuel cells, solar cells, storage devices, light-emitting devices
- Interdisciplinary Energy Materials Science 1,2
  - (1) Light in materials
    - Metallic materials, semiconductors, dielectric materials, superconductive materials
  - (2) Heat in materials
    - High-temperature materials, low-temperature materials, catalysts, ion conduction
- Energy system theory
  - New social mechanisms, etc. (e.g. Hydrogen Society)
- Economy of energy system
  - Why are electric fees about 27 yen per kWh?
  - Are you familiar with life cycle assessment and the input-output table?
  - What is the status of energy development policies in Japan?
  - What is the mechanism and explanation for consensus building based on wind power generation?



Understanding fundamental theory required for energy conversion

Interdisciplinary scientific principles of energy 1

1 . Thermodynamics → Calculate maximum theoretical value of energy Conversion.

Fuel combustion governed by serial and parallel processes

2. Kinetics

Response and transport phenomena → Rate of energy conversion

Interdisciplinary scientific principles of energy 2

3. Electrochemistry → Rate of energy conversion

4. Material Science (Solid-state chemistry Polymer science, Ceramics, Solid-state physics Metallurgy etc.) → Materials research and development

Interdisciplinary scientific principles of energy 1, 2

Fundamentals of electron behavior in solids (quantum mechanics, bands…) Lattice vibration affects conduction (phonon) and optical properities of electrons in solids

Interdisciplinary Energy Materials/Device Science 1,2

Economics of energy system

1 energy supply cost
2. cost benefit analysis
3 lifecycle assessment (LCA)
4 energy econometric analysis
5 energy systems analysis
6 energy technology research & development, diffusion and deployment (RDDD)
7 consensus building of energy technology deployment

Advanced science and technology in energy and environment

a course contributed by Japan Institute for Social and Economic Affairs (Keizai Koho Center).

lectured by distinguished leaders in industry and experts in research and development department of the company

Career development courses - master

- Master's students are required to acquire the necessary credits in the career development courses with fulfilling all the Graduate Attributes (GA) , both C0M and C1M, more than 2 credits.

Note to take both C0M and C1M

- Energy course provides some subjects which could be transfer to this credits.
- Energy Course
  - Energy innovation co-creative project（poster presentation，1 credit）C1M (next page)
  - Energy engineering internship A，B （need contract in advance） C1M
  - Introduction to intellectual property system 研究者向け特許論文等知財の基礎 C0M, C1M
- See (学修案内　表M3　エネルギーコースキャリア対応科目を参照)

※ If you transfer major related subject to career subject, the credits are counted for career subject only.

C0M: Able to delineate one's career plan clearly and recognize the skills to materialize the plan, also considering its relations to the society.

C1M:Able to utilize its own expertise to the development of academia and technology, and work with others with different expertise to contribute to problem-solving.

Refer to; https://www.titech.ac.jp/enrolled/career/career_education/

Energy innovation co-creative project (M)
Practical research in energy science A (D)

- Interdisciplinary presentation

- Interaction and discussion beyond the departments

- Special lecture

Poster Presentation

The course is planning to hold the online class on Dec. 1, 2020 (Tue).

Requirements for Master's Program of Energy Science and Engineering

Note :

At least 4 credits from energy course in student's affiliated department for students in Department of Chemistry and Department of Transdisciplinary Science and Engineering

For students in Department of Chemistry, a minimum of 4 credits from the Chemistry major courses (*), and

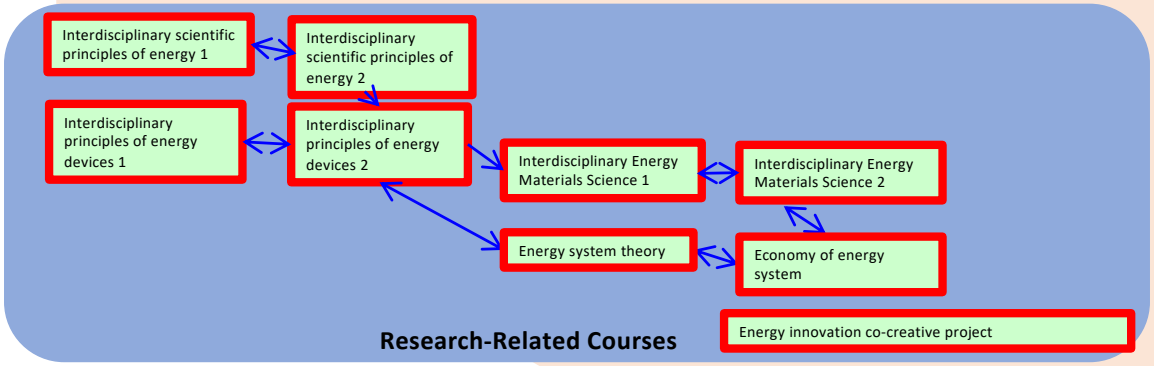
for students in the Department of Transdisciplinary Science and Engineering, a minimum of 4 credits from energy major courses in other departments (either one or more) that offer Graduate Major in Energy Science and Engineering.

【Department of Chemistry, Major of Energy Science and Engineering (Master's program)】

Required Courses　Elective Courses

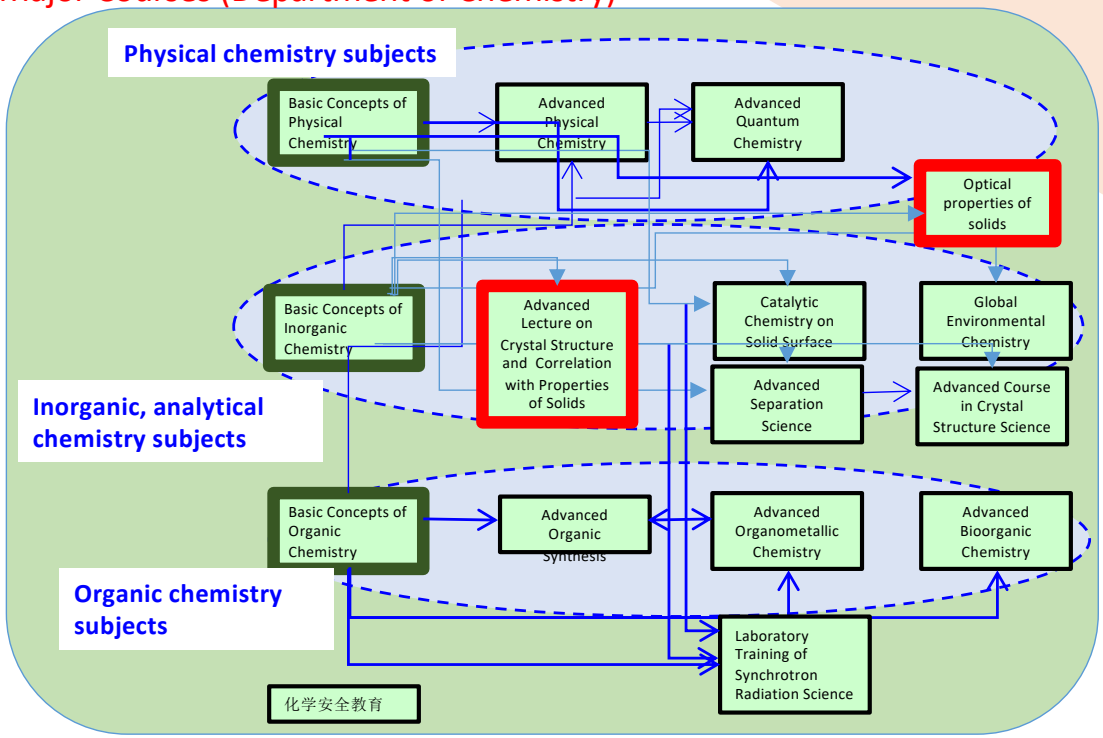
1①	1②	1③	1④	2①	2②	2③	2④

Interdisciplinary Scientific Principles of Energy Courses



Master's Thesis Research

Major Courses (Department of Chemistry)



Red frame : Major courses
Brown frame : Common subjects in chemistry department
Black frame : Subjects of chemistry course (recommended)

Ask your advisor for the most recent version.

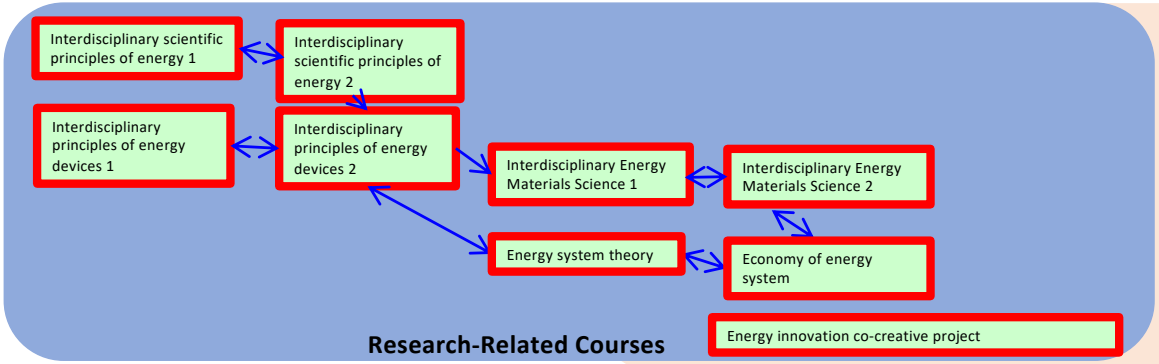
Research Seminars	Seminar in energy science S1	Seminar in energy science F1	Seminar in energy science S2	Seminar in energy science F2

【Department of Mechanical Engineering, Major of Energy Science and Engineering (Master's program)】

Required Courses | Elective Courses

1①	1②	1③	1④	2①	2②	2③	2④

Interdisciplinary Scientific Principles of Energy Courses

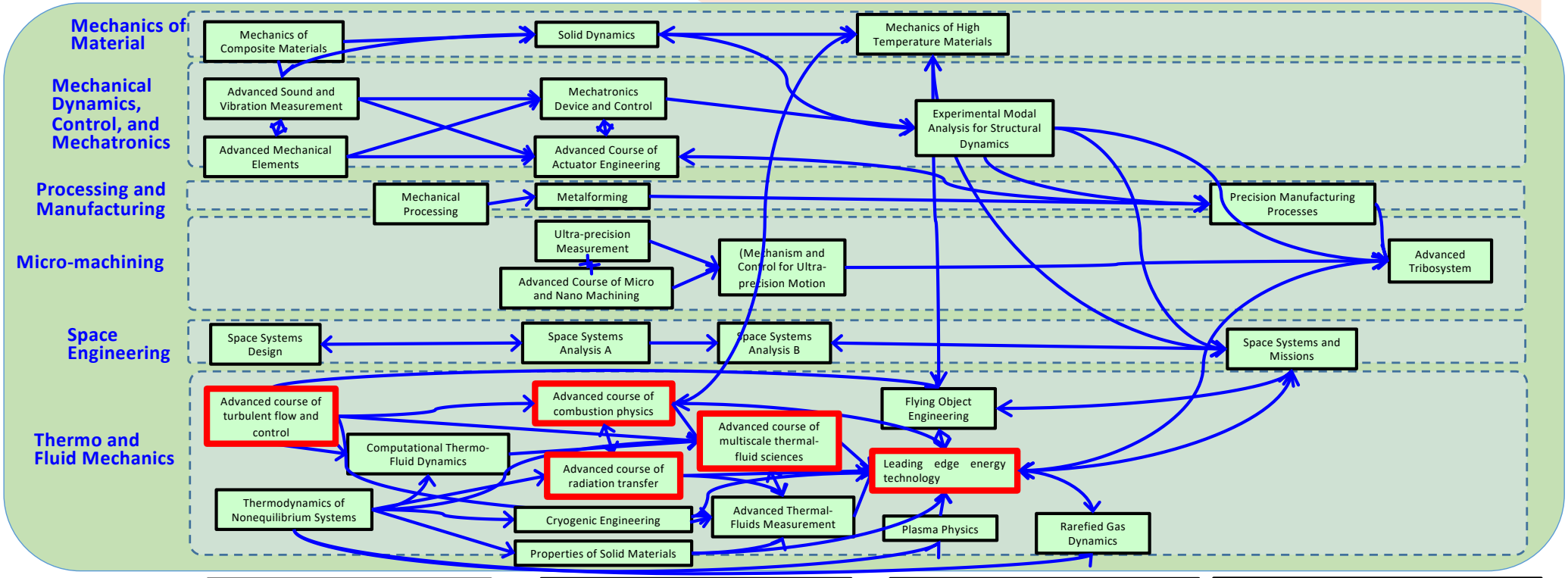


Ask your advisor for the most recent version.

Master's Thesis Research

Red frame: Major Courses
Black frame: Research-Related Courses

Major Courses (Department of Mechanical Engineering)



Research Seminars

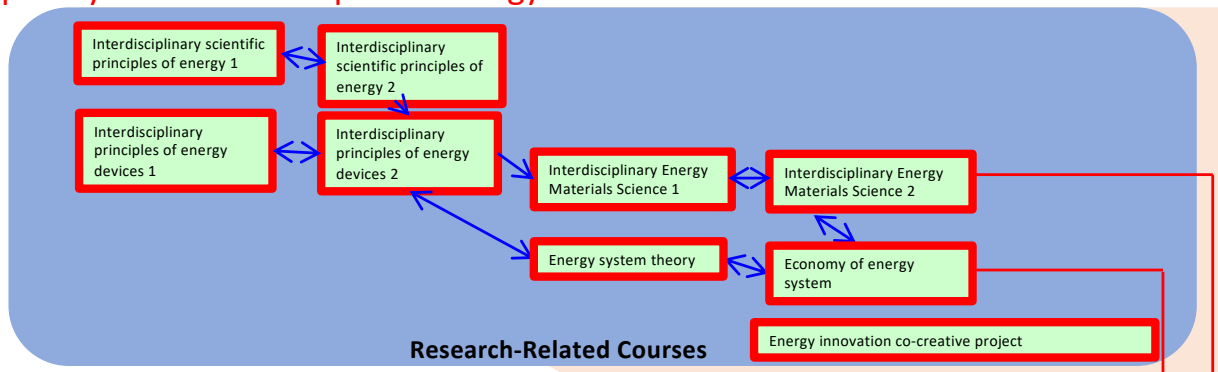
Seminar in energy science S1 | Seminar in energy science F1 | Seminar in energy science S2 | Seminar in energy science F2

【Department of Electrical and Electronic Engineering, Major of Energy Science and Engineering (Master's program)】

Required Courses | Elective Courses

1①	1②	1③	1④	2①	2②	2③	2④

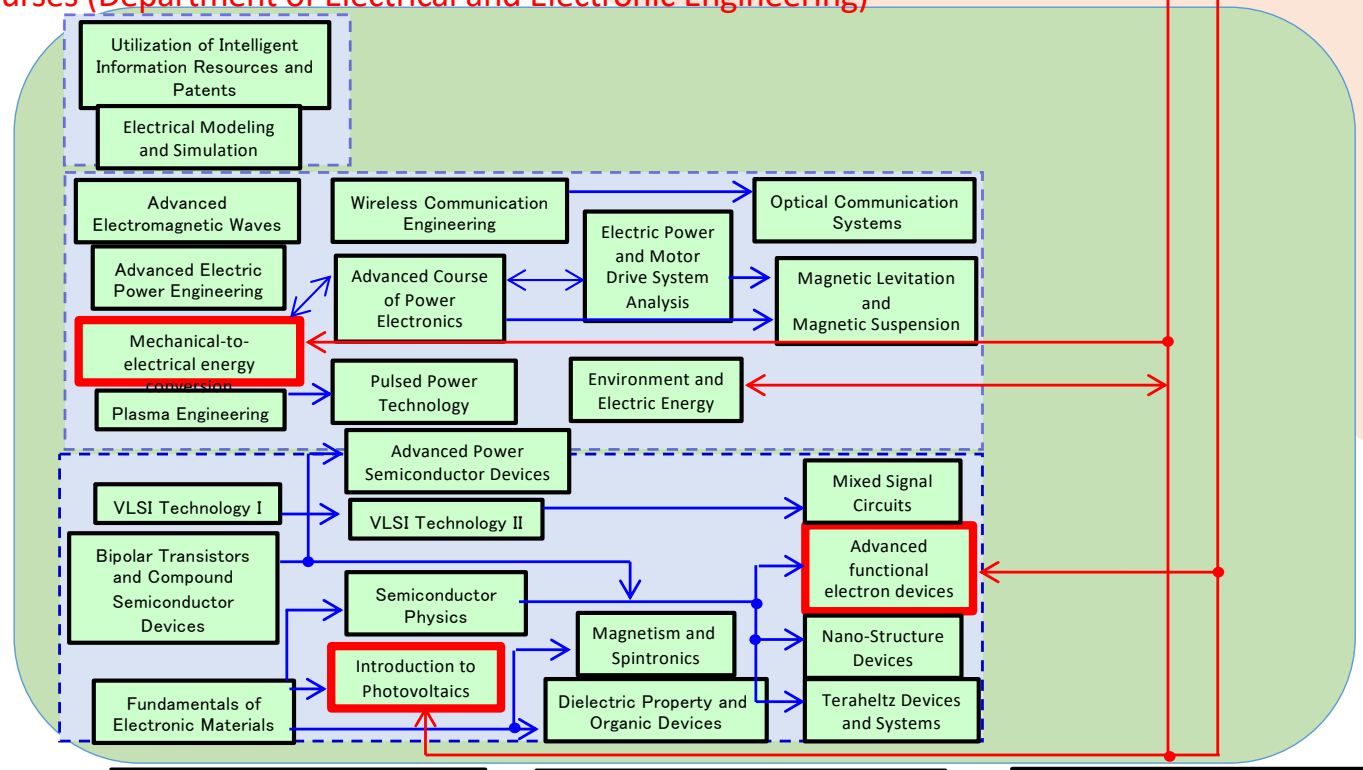
Interdisciplinary Scientific Principles of Energy Courses



Master's Thesis Research

Red frame: Major Courses
Black frame: Research-Related Courses

Major Courses (Department of Electrical and Electronic Engineering)



Ask your advisor for the most recent version.

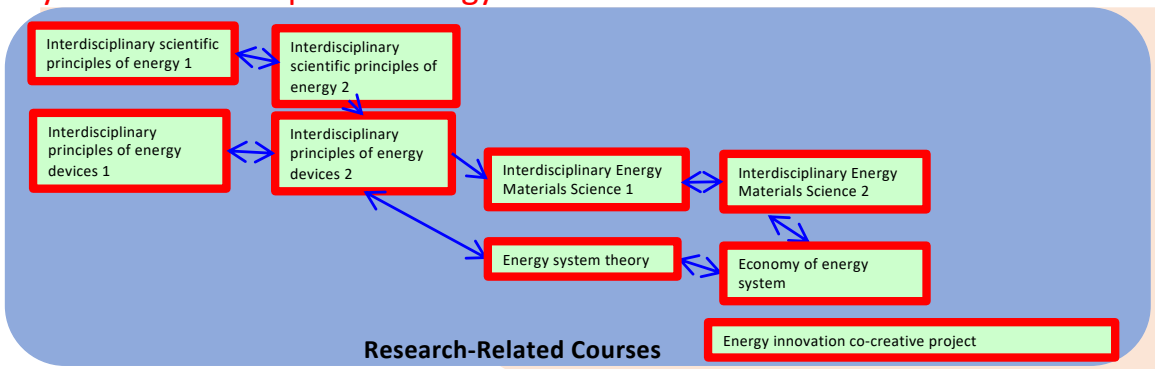
Research Seminars	Seminar in energy science S1	Seminar in energy science F1	Seminar in energy science S2	Seminar in energy science F2

【Department of Materials Science and Engineering, Major of Energy Science and Engineering (Master's program)】

Required Courses　Elective Courses

1①	1②	1③	1④	2①	2②	2③	2④

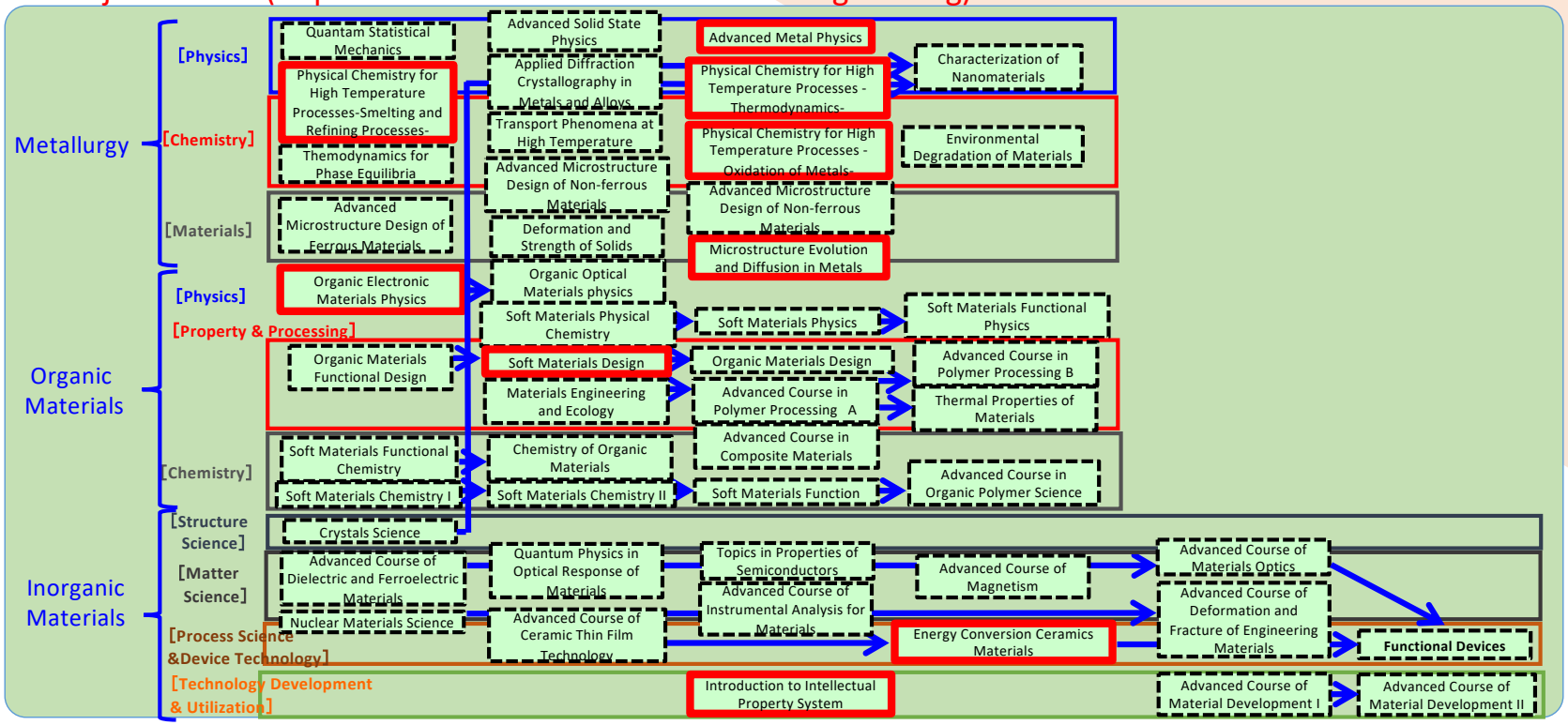
Interdisciplinary Scientific Principles of Energy Courses



Master's Thesis Research

Red frame: Major Courses
Black frame: Research-Related Courses

Major Courses (Department of Materials Science and Engineering)



Ask your advisor for the most recent version.

Research Seminars

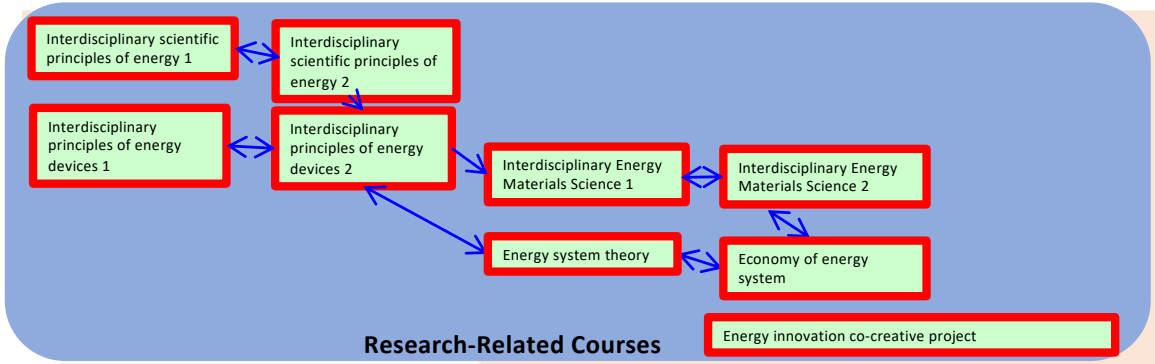
Seminar in energy science S1	Seminar in energy science F1	Seminar in energy science S2	Seminar in energy science F2

【Department of Chemical Science and Engineering, Major of Energy Science and Engineering (Master's program)】

Required Courses | Elective Courses

1①	1②	1③	1④	2①	2②	2③	2④

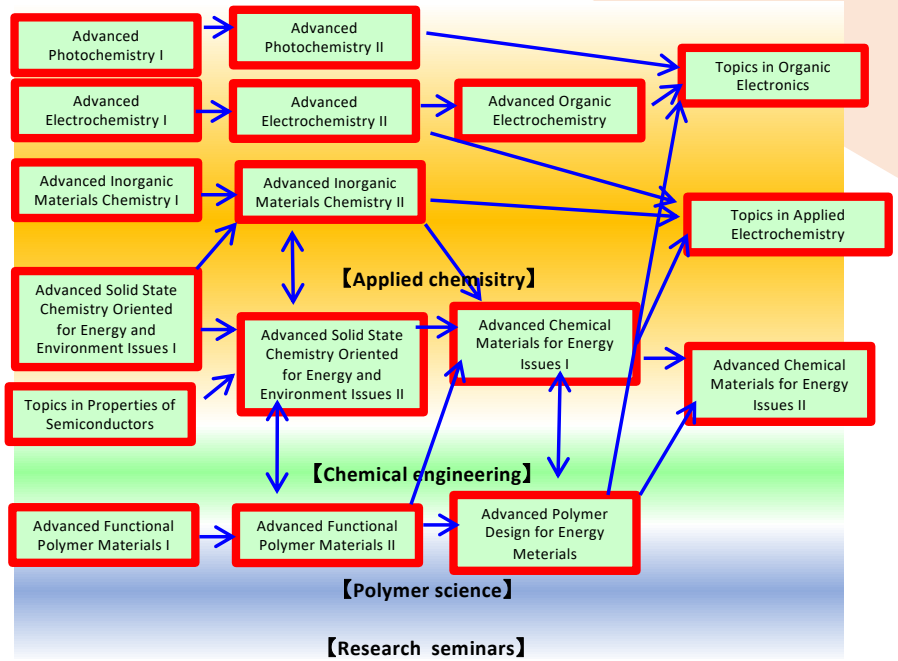
Interdisciplinary Scientific Principles of Energy Courses

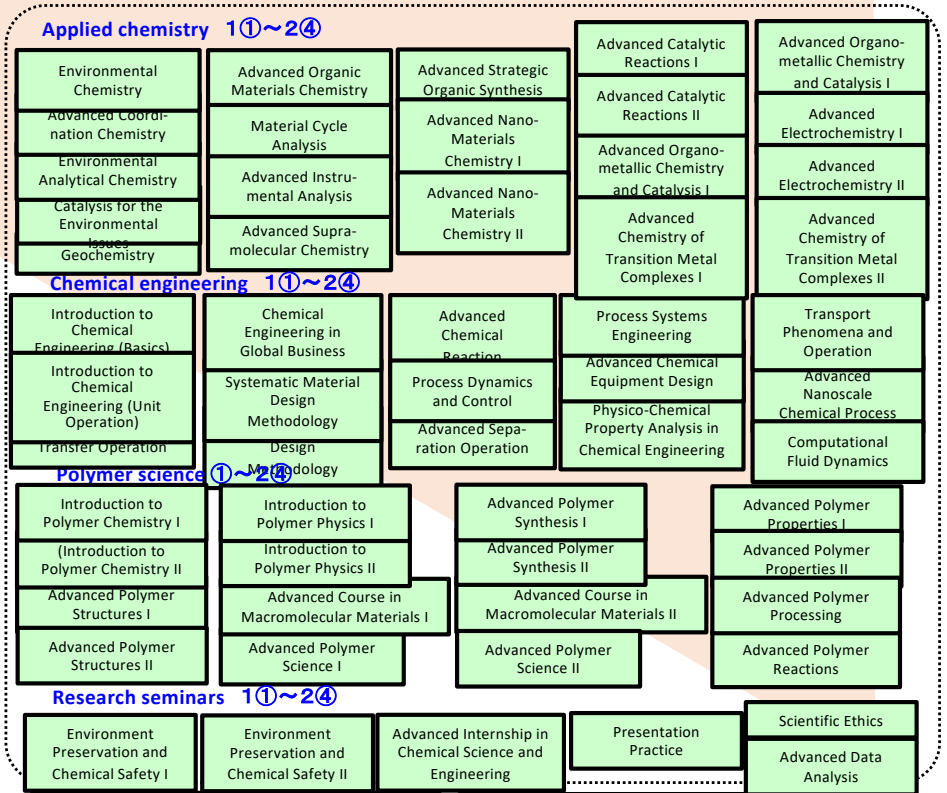


Master's Thesis Research

Red frame: Major Courses
Black frame: Research-Related Courses

Major Courses (Department of Chemical Science and Engineering)





Ask your advisor for the most recent version.

Research Seminars

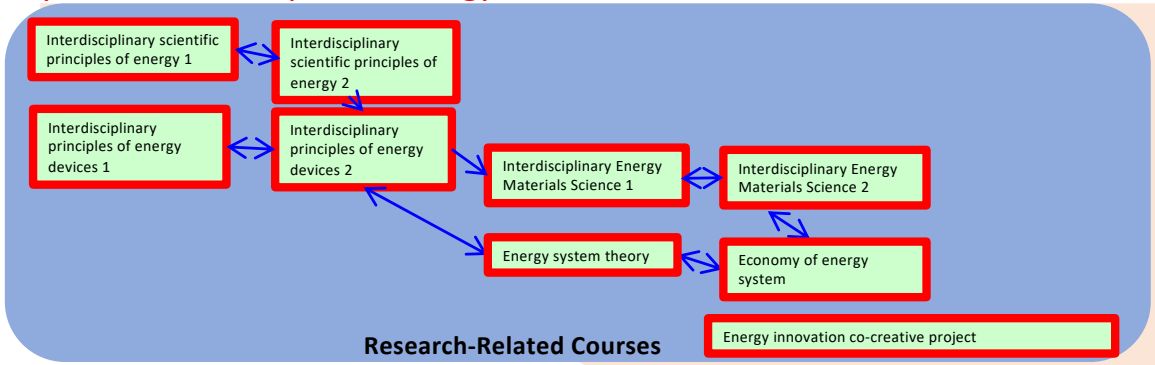
Seminar in energy science S1 | Seminar in energy science F1

【Department of Transdisciplinary Science and Engineering, Major of Energy Science and Engineering (Master's program)】

Required Courses　Elective Courses

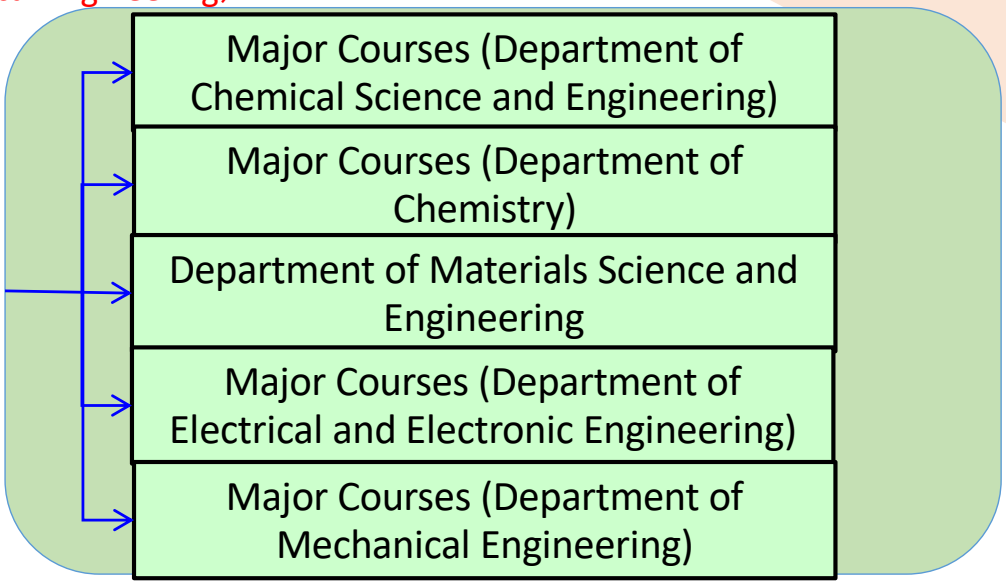
1①	1②	1③	1④	2①	2②	2③	2④

Interdisciplinary Scientific Principles of Energy Courses



Master's Thesis Research

Major Courses（Chemical Science and Engineering, Chemistry, Materials Science and Engineering, Electrical and Electronic Engineering, or Mechanical Engineering）



Research Seminars

Seminar in energy science S1	Seminar in energy science F1	Seminar in energy science S2	Seminar in energy science F2

Ask your advisor for the most recent version.

研究倫理教育チェックリスト（修士用）
Checklist of Education for Research Ethics (for Master Course)

履修したものにチェックをつけること．下記の 1)-3)のいずれか一つを受講することが推奨されている.

Check subjects that you completed. You should complete either of 1) - 3) below.

キャリア科目「科学者の倫理」もしくは「技術者の倫理」

Career development course “Ethics of Scientists” or “Ethics of Engineers” ☐

日本学術振興会（JSPS）研究倫理eラーニングコース（el_CoRE） ☐

JSPS e-leaning course on research ethics (eL CoRE)

https://www.jsps.go.jp/j-kousei/index.html

APRIN e ラーニング「JST 事業受講者コース(2)(理工系)」下記単元 ☐

APRIN e-learning “JST 事業受講者コース(2)(理工系)” below modules

・研究不正 Research Misconduct

・工学研究におけるデータの管理上の倫理問題

Ethical Issues in the Management of Data in Engineering Research

・研究者の社会的責任と告発

Whistleblowing and the Obligation to Protect the Public

Doctoral Program

Requirements for Doctoral Program of Energy Science and Engineering

Course classification		Required credits	Elective credits	No. of credits	Relation with studied content	Notes
Liberal Arts and Basic Science Courses	Humanities and social science courses		At least 2 credits	At least 6 credits	B	600-level
	Career development courses		At least 4 credits		C, D, E	600-level
	Other					
Core courses	Seminars	Two credits from following: Seminars in Energy Science S3 Seminar in Energy Science F3 Seminar in Energy Science S4 Seminar in Energy Science F4 Seminar in Energy Science S5 Seminar in Energy Science F5 Total of 12 credits		At least 18 credits from major courses	A, B, C, D, E	600-level
	Research related courses				C, D, E	
	Specialized courses		At least 6 credits		A, B, C, D	600-level
Total credits for graduation		The student must obtain the requirements listed above and obtain at least 24 credits				

4 credits and 4 GA!!

Research activity at lab.

Japanese language and culture courses can be recognized as equivalent to the Humanities and Social Science Courses, corresponding to 400, 500, and600-level courses.

Structure of Core Courses for the Doctoral Program

- Accreditation for normal research activities
- At least 6 credits
- Lecture courses
  - Students take lectures given by native English faculty and acquire the skills to write English papers. These courses are useful when writing papers and enrollment is highly recommended by faculty.
    - Academic Writing A 1 credit 1Q
    - Academic Writing B 1 credit 2Q
  - Students acquire presentation skills for domestic conferences and international conferences through preparation, presentation practice, response to questions, and giving actual presentations/handling actual Q&A.
    - Practical Presentation A 1 credit (1Q to 4Q)
    - Practical Presentation B 1 credit (1Q to 4Q)
    - Practical Presentation C 1 credit (1Q to 4Q)
    - International scientific presentation A 1 credit (1Q to 4Q)
    - International scientific presentation B 1 credit (1Q to 4Q)
    - International scientific presentation C 1 credit (1Q to 4Q)
  - Students acquire teaching skills such as instructing younger students, RA activities, mock lectures, etc.
    - Academic teaching 1 credit (1Q to 4Q)
  - Acquire the skills for structuring and executing research through conceptual presentations, progress reports, etc. for Doctoral research.
    - Practical research in energy science A 1 credit (1Q to 4Q)
    - Practical research in energy science B 1 credit (1Q to 4Q)
  - Acquire international skills and communication ability through internships.
    - International energy project 2 credits (1Q to 4Q)

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Credits for mid-term presentation

“Practical research in energy science C” (credit 1) and/or “Practical research in energy science D” (credit 1)

Credits depend on the activity of the department.

（別表）エネルギー学理実践研究C,Dと各系の科目対応表

	化学系	機械系	電気系	材料系	応化系	融合系
エネルギー学理実践研究C	先端化学特別演習 （D2；2単位） （中間発表） ※必修	中間発表にていずれか１単位を認定	中間発表にていずれか１単位を認定	材料工学特別 セミナー第一 （D1；1単位）	課題解決実践 プログラム第二 （D1；1単位） ※リサーチ提案・ ポスター発表	中間発表にていずれか１単位を認定
エネルギー学理実践研究D				材料工学特別 セミナー第三 （D2；1単位）	課題解決実践 プログラム第四 （D2；1単位） （中間発表） ※口頭発表	

Career development courses - doctor

Doctoral degree program students are required to fulfill the following conditions;

- Register in either the Academic Leader Program(ALP) or the Productive Leader Program(PLP) based on their individual career plans. IIDP will ask you the registration of the programs6 months after your doctoral degree program started.
- Each program will require the acquisition of Graduate Attributes (GA) shown below. Through career development courses established by the IIDP, or equivalent courses specified by your department, the students are required to earn 4 credits which should meet the 4 Graduate Attributes (GAs).

  Note to take all A0D, A1D, A2D and A3D, or take all P0D, P1D, P2D and P3D.

- As to the courses with more than one GA, the number of GA stipulated for the courses is considered to be acquired regardless of the credits received for the courses.

Career development courses - doctor

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4 credits which should meet the 4 Graduate Attributes (GAs).

Don’t mix

Table A-1 Academic Leader Program (ALP) Graduate Attributes

A0D	You will be able to precisely define your own career plan and train yourself to acquire the skills required for attaining your goals in academia
A1D	You will be able to ascertain the true nature of phenomena, master the secret of learning, and lead the vanguard of a new academic discipline or research area
A2D	You will be able to understand the position of academia in society as well as the notion of responsible conduct of research, and adequately explain academic progress to members of society, who are our stakeholders
A3D	With the understanding of the social roles and responsibilities of researchers, you will be able to nurture next-generation experts in educational institutions, instilling in them an interest in academia and enabling them to later join in the pioneering of new academic disciplines or research areas

Table A-2 Productive Leader Program (PLP) Graduate Attributes

P0D	You will be able to precisely plot your own career plan and train yourself to acquire the skills required for attaining your goals in industry, etc.
P1D	You will be able to precisely grasp the needs of society and detect its problems, comprehend relevant laws, regulations, or guidelines for responsible conduct of research, and lead future developments in science and technology
P2D	While leading teams consisting of members with varied specialties and value systems, you will be able to create products and enterprises that bring forth new values in society
P3D	With the understanding of the social roles and responsibilities of engineers, you will be able to nurture next-generation experts through the project, enabling them to play vital future development of society and industry

If you have working career at company, IIDP accredits credits based on application. Discuss with your supervisor.

【Core Courses of the Graduate Major in Energy Science and Engineering（Doctor's Program）】

Required Courses　Elective Courses

1①	1②	1③	1④	2①	2②	2③	2④	3①	3②	3③	3④

Doctoral Dissertation Research

Humanities and Social Sciences Courses

- Independent Studies Courses 1
- Path-Breaking Liberal Arts Courses1

Career Development Courses

- Independent Studies Courses 1
- Path-Breaking Liberal Arts Courses1
- ALP Introduction
- ALP Practice I (Teaching Practice)

Major Courses

- Academic WritingA
- Academic WritingB1
- International scientific presentation A
- Practical research in energy science A
- International scientific presentation B
- Practical research in energy science B

Research Seminars

- Seminar in energy science S3
- Seminar in energy science F3
- Seminar in energy science S4
- Seminar in energy science F4
- Seminar in energy science S5
- Seminar in energy science F5

Ask your advisor for the most recent version.

研究倫理教育チェックリスト（博士用）
Checklist of Education for Research Ethics (for Doctoral Course)

履修したものにチェックをつけること．下記の 1)-3)のいずれか一つを受講することが推奨されている．

Check subjects that you completed. You should complete either of 1) - 3) below.

キャリア科目「科学者・技術者の倫理」 Career development course “Ethics of Scientists and Engineers” ☐

日本学術振興会（JSPS）研究倫理eラーニングコース（el_CoRE） ☐

JSPS e-leaning course on research ethics (eL CoRE)

https://www.jsps.go.jp/j-kousei/index.html

APRIN e ラーニング「JST 事業受講者コース(2)(理工系)」下記単元 ☐

APRIN e-learning “JST 事業受講者コース(2)(理工系)” below modules

・研究不正 Research Misconduct

・工学研究におけるデータの管理上の倫理問題

Ethical Issues in the Management of Data in Engineering Research

・研究者の社会的責任と告発

Whistleblowing and the Obligation to Protect the Public

・責任あるオーサーシップ Responsible Authorship

・理工学研究領域の論文発表とピア・レビュー

Ethical Issues in the Peer Review and Publication of Engineering Research

・理工学分野における共同研究 Collaborative Research in Engineering Fields

・公的研究費の取扱い Managing Public Research Funds

Degree Course Milestones

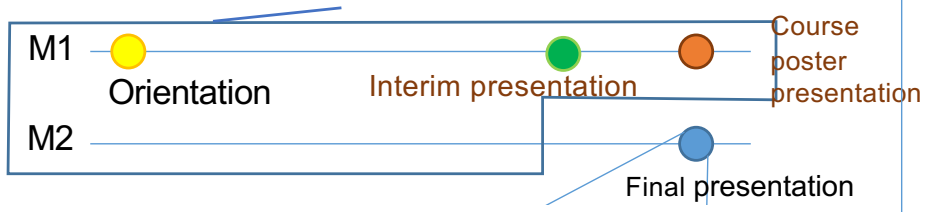
Degree Milestones

- In Master's or Doctor's Program, interim research-progress presentations are conducted with his/her department.
  - Demonstrate acquisition of specialized knowledge and communication skills
- Master or Doctor thesis defense conducted in the Energy Science and Engineering program.

Milestones for acquiring degree

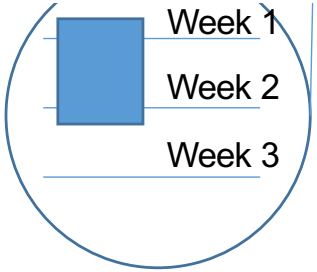
Master's Program

Intermediate presentation with faculty evaluation (assures Specialization)



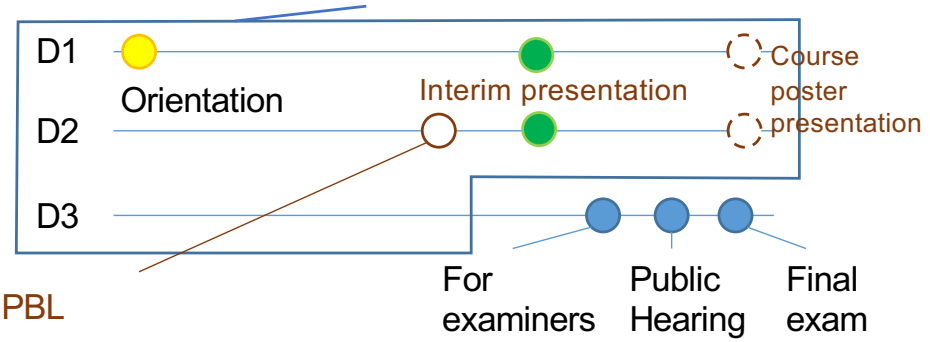
Schedule for M thesis presentation

Based upon dept.



Doctoral Program

Conceptual presentation with faculty evaluation (assures Specialization)

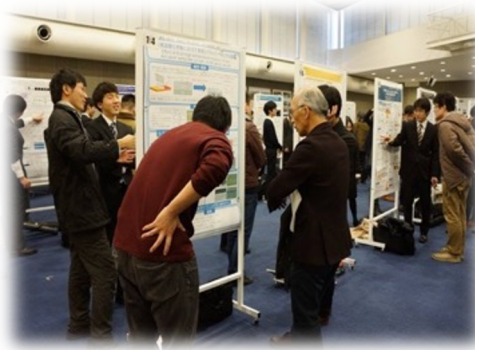


Possible PBL activity

Interim presentation

- A poster presentation held during 1st year of Master's Program for discussion with students and dept. faculty.
- Energy Innovation Collaborative Project (1 credit)

"Practical research in energy science A" (1 credits) joint presentation



Other important items

Japanese Section, Institute for Liberal Arts

Japanese Language and Culture Courses are basically designed for international graduate students, providing programs designated to build up Japanese communication skills and cultural understandings...

http://js.ila.titech.ac.jp/~web/index.html

The detail will be available on the website.

How to read course codes

Example of Energy Science and Engineering course code

ENR.A401.A Interdisciplinary scientific principles 1

Required courses of the Energy Interdisciplinary Principle Courses are denoted by an “A”, other elective courses are denoted by an “L”

A: Energy Interdisciplinary Principle Courses (required course)
B: Energy Interdisciplinary Principle Courses (elective course)
H, E: Department of Chemical Science and Engineering; Major Related Courses
I: Department of Chemistry; Major Related Courses
J: Department of Materials Science and Engineering; Major Related Courses
K: Department of Mechanical Engineering; Major Related Courses
L: Department of Electrical and Electronic Engineering; Major Related Courses
Z: Research Seminars

Security Export Control

- What is Security Export Control ?

Security Export Control is a framework, based on the Foreign Exchange and Foreign Trade Act (FEFTA)[1], to maintain international peace and security by preventing weapons[2] and goods and technologies that could potentially be used for military applications from falling into the hands of terrorists or states that may be a security risk.

[1] Penalties under FEFTA: 【Criminal Penalty】 *Imprisonment:* No more than 10 years; *Fines:* Individual No more than JPY 30 million, Company No more than JPY 1 billion 【Administrative Penalty】 Prohibition of exports for no more than 3 years

[2] "Weapons" means both conventional weapons and weapons of mass destruction (WMD), including nuclear weapons, chemical weapons, biological weapons, and missiles which carry WMD

- If you are thinking about doing any of the following activities, first consult with your academic supervisor. You may be required to follow Security Export Control procedures before proceeding.

1) Going overseas[3]	2) Communicating with those overseas[3]	3) Leaving Tokyo Tech[3]
・Providing undisclosed technical information overseas ・Taking items (samples, equipment, USB memory) out of Japan ＊ Check with your supervisor before sending items abroad. The value of the item is not relevant.	・Transferring undisclosed technical information from your laboratory ＊ Providing information via SNS is also subject to Security Export Control procedures. ＊ Most laboratories prohibit the provision of technical information from the lab to non-lab members.	・Taking undisclosed technical information (data for a thesis/paper, etc.) out of Japan after graduation ・Taking samples of research material out of Japan after graduation

[3] In the case of international students, this includes returning to or communicating with those in their countries

Academic supervisors: When your students are to conduct any of the activities above, you are required to verify whether or not the activity in question is subject to Security Export Control. If internal examination is required, please fill out and submit the Consultation Form (available from the Security Export Control website for faculty members) to the section in charge of Export Control. https://www.titech.ac.jp/staff/world/export_control/

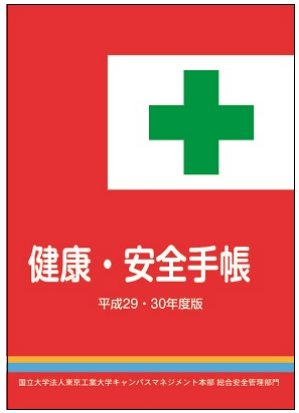
If you have any questions, consult the section in charge of Security Export Control.
Email: stc.soudan@jim.titech.ac.jp

Safety instruction (English)

Download safety handbook (English availabl
http://www.gsmc.titech.ac.jp/

Strongly recommended to join the class!

The detail will be available on the website.



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Remote class using ZOOM (plan)

Tokyo Tech is going to use a software ZOOM for remote classes (lectures) at least until the end of March 2021 (except for some experiments). Class declaration starts on 28 Sep. and ends on 19 Oct. for 3Q and 4Q classes.

Consult your supervisor about your class plan and submit it to the system in Tokyo Tech Portal. After your supervisor's approval, the lecturer gets the list of students who takes the class and send an invitation to the class (Zoom URL and related information) via email. You may have the class at your home or possibly your lab. Q&A, reports and tests will be submitted and delivered through the system in Tokyo Tech Portal (OCW-I, T2schola) or other ways (such as google form).

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- There will be health check-up for freshers on the designated day (based on ID) during 16-22 Oct. for Suzukakedai students and 12-30 Nov. for Ookayama students. Make sure to have it.

- There are obligatory insurances in case of accidents. Additional insurance is necessary when joining off-class internship.

- Follow the network security guidelines of Tokyo Tech. http://cert.titech.ac.jp

Tokyo Tech academy programs

Derived from WISE Program of MEXT (Doctoral Program for World-leading Innovative & Smart Education)

Info SyEnergy (2021.4-)

http://www.chemeng.titech.ac.jp/~iharalab/infosyenergy/en/index.html

Super Smart Society (2020.4-)

https://www.wise-sss.titech.ac.jp/en

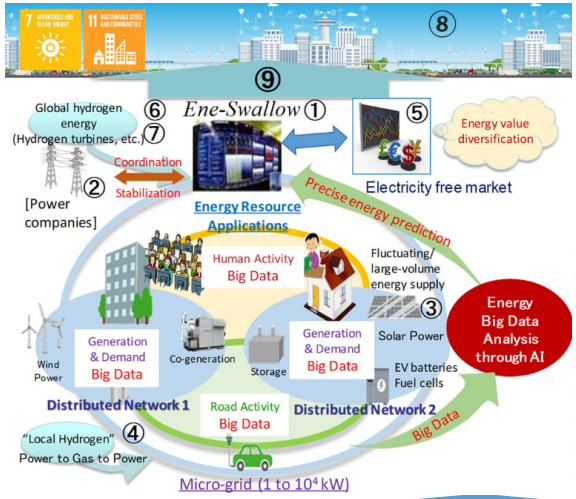
Convergence of Materials and Informatics (2019.4-)

https://www.tac-mi.titech.ac.jp/en/about/

Multi-scope・Energy WISE Professionals

"Professionals" of "Multi-disciplinary energy science" who can design a new sustainable energy society with mastering "big data science" and "social design"

Lead the transformation into a "human-centered, sustainable energy society" which is free from the restrictions such as energy costs or CO_2 emissions with managing energy smartly by "AI analysis of big data"



An energy society combining low-carbon large-scale power sources and distributed systems

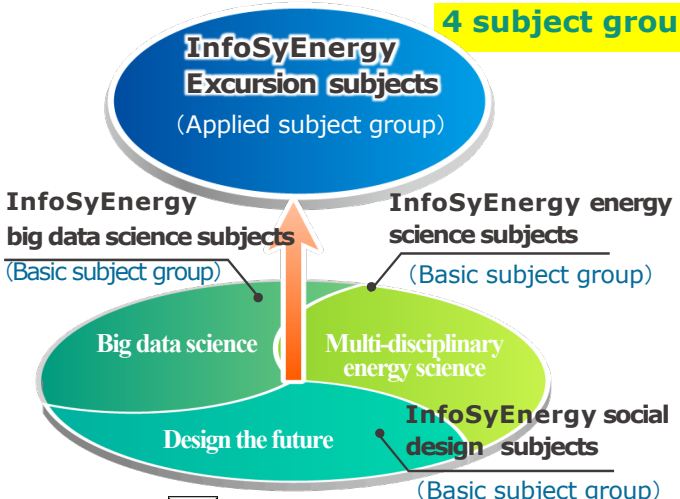
Ambient energy society

① Power distribution systems
② Renewable base-load technology
③ Solar energy conversion
④ Fuel cells, electrolysis(H_2), storage
⑤ Electricity free market, on-campus concepts
⑥ Energy carriers, carbon-reducing catalysts
⑦ Hydrogen combustion, heat utilization
⑧ Future tech
⑨ Tech trends, future scenarios, services

Development of "WISE Professional" with promoting cutting edge researches

Cultivate "3 scopes" by "4 subject groups" collaborating with "InfoSy**Energy** Reserch and Education Consortium"

4 subject groups



Tokyo Institute of Technology × Hitotsubashi University

3 axis, 3 scopes (Multi-scope)

High specialty (discipline)=origin

Social design scope
current situation analysis + future vision

Analyze "current": law/regulation, economy, social situation

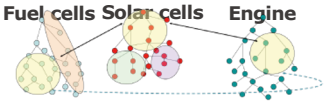
Construct "future" Policy-making, business model, social design

Multi-disciplinary energy science scope
break down and reconstruct the knowledges → overview the energy science

element(nm) system(km)

Break down and reconstruct using analogy
What are different?
What are similar?"

the policy of current "Energy Course"



Enable overviewing and promote deep understanding of each discipline

Reuse knowledge at different fields and make "innovations"

Big data analysis scope
AI analysis + data science

Principles extracted from the trends by big data analysis

Trends in the big data understood by principles

Companies	Public institutions	World top universities
26	5	15

× **Tokyo Tech**

Promote the integrative researches of "system" and "devices"

Various energy devices and elemental technologies of Tokyo Tech

Solid-state batteries | Electrolysis(H_2)/fuel cells | solar cells

Tokyo Tech EEI Building

Campus system technology developed and demonstrated at Tokyo Tech

Distributed Energy system Ene-Swallow

InfoSyEnergy

Research and Education Consortium

Tokyo Tech Academy for SSS (since 2020.4)

Goals of Tokyo Tech Academy for Super Smart Society (SSS)

- to realize a super smart society through a degree program that integrates master and doctoral courses
- to train knowledge professionals with technical and professional knowledge

Benefits for Students

1. Interdisciplinary research projects in collaboration with consortium partners

2. Unique education in cooperation with society through SSS Promotion Consortium

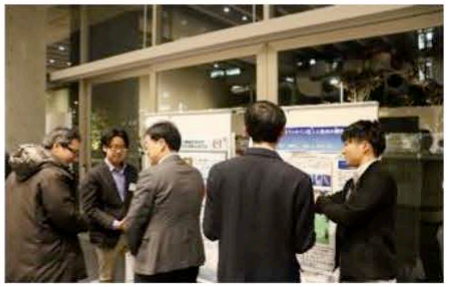
3. Financial support that allows students to concentrate on their education and research

4. International collaborations with overseas organizations and support for travel expenses

2020 Fall SSS Interdisciplinary Matching WS

Date: November, 2020 Place: online

Participation in the matching WS is required for registration



Tokyo Tech Academy for Convergence of Materials and Informatics (TAC-MI)

This event is currently scheduled to be held, but may be suddenly cancelled to prevent coronavirus infection.
In the case of cancellation, we will inform you on our website.

AY2020 Fall Semester Student Recruitment Briefing

MEXT H30 WISE Program: Doctoral Program for World-leading Innovative & Smart Education
"Creating sustainable societies through [Material×Information] multi-talented human resource development"

TAC-MI
Tokyo Tech Academy for Convergence of Materials and Informatics

We look forward to the participation of students who want to make a social impact utilizing materials and information.

In order to foster outstanding individuals, the Institute established the Tokyo Tech Academy for Convergence of Materials and Informatics (TAC-MI) in April 2019 under the auspices of MEXT's WISE Program, and will begin recruiting students starting in the fall of 2020. While in their graduate studies, students pursuing a doctoral degree can take this additional program, which will enable them to connect information with materials by using information science and multifaceted thinking, as well as by taking a broad perspective. The program aims, in addition to the top-level research, to cultivate multi-talented human resources to become leaders in this "space in multi-axes" that is our continually advancing society.

Schedule

Each day, it will be conducted remotely at Ookayama and Suzukakedai.

If you are interested in this program, Please participate in the briefing session. (No advance reservation required)

1st Tuesday, April 28
From 17:15~18:15

Main
W833 (Bldg.8E, Floor 3) Ookayama

Remote
G115 (Bldg.G1, Floor 1) Suzukakedai

2nd Monday, May 25
From 17:15~18:15

Remote
W833 (Bldg.8E, Floor 3) Ookayama

Main
G115 (Bldg.G1, Floor 1) Suzukakedai