JYPE 2016-2017
Spring Semester
Course Description

Tohoku University

Institute for Excellence in Higher Education

Contents

Japanese 1

Instructors: Prof. Satoshi UEHARA, Senior Assistant Prof. Masako HAYASHI and staff
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Japanese 1 is for novice learners. When you successfully complete the course, you can expect to pass Level 5 (N5) of the Japanese Language Proficiency Test (http://www.jlpt.jp/). The course begins with the study of hiragana, katakana and pronunciation and then covers all 25 Lessons of "Minna no Nihongo I" published by 3A Network. The course grade will be based on attendance, participation and in-class quizzes (50%) and the final examination (50%).

The classes (B110a/B110b) will be held on every Monday and Wednesday (except a few national holidays and each class will generally cover 1 lesson. The schedule below is subject to change.

[April 10 (Mon) Orientation]

01. APR 12 (Wed) HIRAGANA

02. APR 17 (Mon) L.1-1
...wa...desu.

03. APR 19 (Wed) L.1-2 / L.2
...wa...ja arimasen. S+*ka*?
Kore/sore/are Soodesu Sooja arimasen
After April 18, the classes will be held on every Monday and Wednesday (except a few national holidays) and each class will generally cover 1 lesson. The schedule below is subject to change.

04. APR 24 (Mon) L.3 ～ JUL 12 (Wed) L.25
L.3
Koko/soko/asoko Doko/dochira N *no* N

L.4
Ima ...ji ...fun desu V-*masu*
masu/mashita/masen/masendeshita ...kara...made N *to* N S+*ne*

L.5
N(place) *e ikimasu Doko e mo ikimasen* N(vehicle) *de ikimasu Itsu* S+*yo*

L.6
...o V *...o shimasu* *Nani o shimasu ka* N(place) *de* V V *masen ka* V *mashoo*

L.7
N(tool/means) *de* V N(person) *ni agemasu* N(person) *ni moraimasu* *Moo* V *mashita*.

L.8
N *wa na*-adj *desu* N *wa i*-adj *desu* *Totemo* *Amari* N *wa doodesu ka* N1 *wa donna* N2 *desu ka* S1 *ga* S2 *Dore*

L.9
N *ga arimasu* N *ga wakarimasu* N *ga sukidesu* *Donna* N *Yoku* *Daitai* *Takusan* *Sukoshi* *Amari* *Zenzen* S1 *kara* S2 *Dooshite*

L.10
N *ga arimasu/imasu* N1(place) *ni* N2 *ga arimasu/imasu* N1 *wa* N2(place) *ni arimasu/imasu* N1(thing/person/place) *no* N2(position) N1 *ya* N2

L.11
Numbers Quantifier(period)*ni ...kai* Quantifier *dake*/N *dake*

L.12
Past tense of noun sentences and *na*-adjective sentences Past tense of *i*-adjective sentences N1 *wa* N2 *yori* adj *desu* N1 *to* N2 *to dochira no hoo ga* adjective *desu ka* N1 *no naka de dore ga ichiban* adjective *desu ka*

L.13
N *ga hoshii desu* V *masu* V *tai desu* N(place) *e* V *masu*-form *ni ikimasu* *Dokoka*/*nanika*
L.14
verb conjugation Verb groups Verb *te*-form Verb *te*-form *kudasai* V *te*-form *imasu* V *masu*-form *mashoo ka* S1 *ga*, S2

L.15
V *te*-form *mo ii desu* V *te*-form *wa ikemasen* V *te*-form *imasu* V *te*-form *imasu*

L.16
V *te*-form, [V *te*-form], ... V1 *te*-form *kara*, V2 N1 *wa* N2 *ga* adjective *Dooyatte Dono* N

L.17
V *nai*-form　V *nai*-form *kudasai*　V *nai*-form *nakereba narimasen*　V *nai*-form *nakutemo ii desu*　N *made ni*

L.18
Verb dictionary form　N/V dictionary form *koto ga dekimasu*　*Watashi no shumi wa* N/V dictionary form *koto desu*　V1 dictionary form *mae ni* V2　*Nakanaka Zehi*

L.19
Verb *ta*-form　V *ta*-form *koto ga arimasu ka*　V *ta-ri*, V *ta-ri shimasu*　*i*-adj *ku narimasu*　*na*-adj/N *ni narimasu*　*Soodesu ne*

L.20
Polite style and plain style　Conversation in the plain style

L.21
plain form *to omoimasu*　S/plain form *to iimasu*　plain form *deshoo*　N1(place) *de* N2 *ga arimasu*　N(occasion) *de*

L.22
Noun modification　Noun modification by sentences

L.23
...toki, ...　V dictionary form/V *ta*-form *toki*　V dictionary form *to, ...*　N *ga* adjective/V

L.24
Kuremasu　V *te*-form *agemasu/moraimasu/kuremasu*　V *te*-form *moraimasu*　V *te*-form *kuremasu*　N(person) *ga* V　Interrogative *ga* V

L.25
V *ta*-form *ra, ...*　*...kute mo*　*...demo*　*Moshi*　*Ikura ...temo/demo*

05. JUL 19 (Wed)　EXAMINATION

Japanese 2

Instructors: Prof. Satoshi UEHARA, Senior Assistant Prof. Masako HAYASHI and staff
Contact e-mail address: Uehara: uehara@he.tohoku.ac.jp, Hayashi:masako@tohoku.ac.jp

Japanese 2 is for those who have finished Japanese 1 or those who have equal proficiency (i.e., Level II according to the placement test for JAPANESE LANGUAGE PROGRAM AT KAWAUCHI). When you successfully complete this course, you can expect to pass Level 4 (N4) of the Japanese Language Proficiency Test (http://www.jlpt.jp/). The course covers all 25 Lessons of "Minna no Nihongo II" published by 3A Network. The course grade will be based on attendance, participation and in-class quizzes (50%) and the examinations (50%).

The classes (B210a/B210b /B210c) will be held on every Monday and Wednesday (except a few national holidays) and each class will generally cover 1 lesson. The schedule below is subject to change.

The classes will be held on every Monday and Thursday (except a few national holidays) and each class will generally cover 1 lesson. The schedule below is subject to change.

[April 10 (Mon) Orientation]

01. APR 12 (Wed) L.26 ～ MAY 24 (Mon) L.36

L.26

...n desu V *te*-form *itadakemasen ka* Interrogative V *ta*-form *ra ii desu ka* *..wa suki/kirai/joozu/heta desu*

L.27

Potential verbs *Miemasu* *Kikoemasu* *Dekimasu* *wa/mo/shika*

L.28

V1 *masu*-form *nagara* V2 V *te*-form *imasu* plain form *shi, ...* *Soreni* *Sorede*

L.29

V *te*-form *imasu* N *ga* V *te*-form *imasu* N *wa* V *te*-form *imasu* V *te*-form *shimaimashita* *Dokokani* *Dokokade*

L.30

V *te*-form *arimasu* N1 *ni* N2 *ga* V *te*-form *arimasu* N2 *wa* N1 *ni* V *te*-form *arimasu* V *te*-form *okimasu* V *te*-form *okimasu* *Mada* V(affirmative)

L.31
Volitional form　V volitional form *to omotte imasu*　V dictionary form *tsumori desu*　V *nai*-form *tsumori desu*　V dictionary form/N *yotee desu*　*Mada* V *te*-form *imasen*

L.32
V *ta*-form *hoo ga ii desu*　V *nai*-form *hoo ga ii desu*　*...deshoo*　*...kamoshiremasen*　*Kitto*　*Tabun*　*Moshikashitara*

L.33
Imperative and prohibitive forms　*...to yomimasu*　*...to kaite arimasu*　X *wa* Y *to yuu imi desu*　S/plain form *to itte imashita*　S/plain form *to tsutaeteitadakemasen ka*

L.34
V1 *toori ni* V2　N *no toori ni* V　V1 *ta*-form *ato de*, V2　N *no atode* V　V1 *te*-form V2　V1 *nai*-form *naide* V2

L.35
Conditional form　*...to*　*...tara*　N *nara*　*...hodo ...*

L.36
...yoo ni V　*...yoo ni narimasu.*　*...yoo ni shimasu*

02. MAY 24 (Wed)　MIDTERM EXAMINATION

03. MAY 29 (Mon) L.37 ～ JUL 12 (Wed) L.50
L.37
Passive verbs　N1(person1) *wa* N2(person2) *ni* V passive　N1(person1) *wa* N2(person2) *ni* V passive　N(thing) *ga/wa* V passive　N1 *wa* N2(person) *ni yotte* V passive

L.38
V plain form *no wa/ga/o ...*　*... tokimo/tokiya/tokino/tokini*

L.39
V *te*-form, ...　V *nai*-form *nakute, ...* *i*-adj *kute, ...*　*na*-adj *de, ...*　*...node, ...*

L.40
Interrogative V/*i*-adj/*na*-adj/N plain form *ka, ...*　*... ka doo ka, ...*　V *te*-form *mimasu*

L.41
N1 *ni* N2 *o yarimasu* N1 *ni* N2 *o itadakimasu* N *o kudasaimasu* V *te*-form *yarimasu* V *te*-form *itadakimasu* V *te*-form *kudasaimasen ka* N *ni* V
L.42
... tame ni, ... V dictinary form *no ni ...*

L.43
V *masu*-form/*i*-adj/*na*-adj *soo desu* V *te*-form *kimasu*

L.44
V *masu*-form/*i*-adj/*na*-adj *sugimasu* V *masu*-form *yasui desu* V *masu*-form *nikui desu* *i*-adj *ku shimasu* *na*-adj *ni simasu* N *ni shimasu*

L.45
...baai wa, ... *...noni, ...*

L.46
V dictionary form *tokoro desu* V *ta*-form *tokoro desu* V *ta*-form *tokoro desu* V *ta*-form *bakari desu* *...hazu desu*

L.47
plain form soo desu ...yoo desu

L.48
Causative verbs V causative te-form itadakemasenka

L.49
Keigo 1 honorific verbs o V masu-form ni narimasu o V masu-form kudasai

L.50
Keigo 2 o V masu-form shimasu go V shimasu polite expressions
gozaimasu ...de gozaimasu yoroshii deshoo ka

04. JUL 19 (Wed) EXAMINATION

Japanese 3

Instructors: Prof. Satoshi UEHARA, Senior Assistant Prof. Masako HAYASHI and staff
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Japanese 3 is for those who have completed Japanese 2 in the preceding semester or those who have equal proficiency (i.e., Level III according to the placement test for JAPANESE LANGUAGE PROGRAM AT KAWAUCHI). When you successfully complete this course, you can expect to pass Level 3 (N3) of the Japanese Language Proficiency Test (http://www.jlpt.jp/). Japanese 3 consists of the following four classes, and you must take all four classes to receive a grade for the course:

[April 10 (Mon) Orientation]

G310 (Grammar):

Learn and practice intermediate level grammatical patterns. The course materials are provided by the instructor.

S310a/S310b (Speaking):

Learn how to convey one's ideas and opinions orally in Japanese by having discussions and presentations on current familiar topics in class. The course materials are provided by the instructor.

R310 (Reading):

Practice reading easy but authentic reading materials to familiarize yourself with written Japanese and boost your reading comprehension ability. The textbook is "Daigaku/Daigakuin Ryuugakusei no Nihongo 1- Reading Comprehension-" (revised version) published by ALC.

P310a/P310b (Practice):

Practice and utilize what you have learned in grammar, reading and speaking classes in actual communicative contexts.

Each class has its own class and exam schedule and grading policy, which are to be announced on the first day of the class. Japanese 3 grade will be based on the average score of the four classes.

Japanese 4

Instructors: Prof. Satoshi UEHARA, Senior Assistant Prof. Masako HAYASHI and staff
Contact e-mail address: Uehara: uehara@he.tohoku.ac.jp, Hayashi:masako@tohoku.ac.jp

Japanese 4 is for those who have completed Japanese 3 in the preceding semester or those who have equal proficiency (i.e., Level IV according to the placement test for JAPANESE LANGUAGE PROGRAM AT KAWAUCHI). When you successfully complete this course, you can expect to pass N2 of the Japanese Language Proficiency Test (http://www.jlpt.jp/). Japanese 4 consists of the following six classes, and you must take FOUR of them to receive a grade for the whole course:

[April 10 (Mon) Orientation]

G410 (Grammar):

Learn and practice upper-intermediate level grammatical patterns. The textbook will be announced by the instructor in the first class.

S410 (Speaking):

Learn how to convey one's ideas and opinions orally in Japanese by having discussions and presentations on current familiar topics in class. You are required to write a resume and short reports. The course materials are provided by the instructor.

R410 (Reading):

Practice reading easy but authentic reading materials to familiarize yourself with written Japanese and boost your reading comprehension ability. The textbook is "Daigaku/Daigakuin Ryuugakusei no Nihongo 3: Ronbun Dokkai hen" published by ALC.

P410 (Practice):

Practice and utilize what you have learned in grammar, reading and speaking classes in actual communicative contexts.

CC430 (Cross-cultural Communication (Intermediate Co-learning Seminar)):

This class provides you with opportunities to gain wider and deeper perspectives of Japanese culture and society and also reflect on your own cultural values through active interactions with Japanese students. The class will help you improve your communication and presentation skills in Japanese.

MM400 (Multimedia based Japanese Learning -Talk about your language and culture through manga and animation (Intermediate Co-learning Seminar)):

Through group work with Japanese students and foreign students, you will prepare multimedia teaching materials, using as comics, animation, dramas etc., that you will actually use to teach. Through collaborative learning between Japanese students and foreign students, and by explaining the language and culture of your country, you will deepen your understanding of your own culture and cross-cultural understanding.

Each class has its own class and exam schedule and grading policy, which are to be announced on the first day of the class. Japanese 4 grade will be based on the average score of the four classes you choose.

Course Title	Japanese Culture B
Semester	Spring 2017
Credit	2
Instructor	Part-time lecturer Koji SHIDARA
E-mail	kojishidara@gmail.com
Class Hours / Period	14 :40-16 :10 Wednesday April 12 – July 5, 2017
Room	2nd Floor, Room “Ka-Shou 2” (711), Department of Applied Chemistry, Chemical Engineering and Biomolecular Engineering, Aobayama campus

Course Objectives

An exploratory culture course, Japanese Culture B is offered for foreign students to learn about and share insights into various aspects of the living culture of Japan with some emphasis placed on the effects of the Great East Japan Earthquake of 2011 and the rebuilding effort thereafter. Students will learn not only through discussion and lecture but through actually participating in some of the large-scale rebuilding efforts taking place in the area.

Course Summary

The course comprises three basic approaches: discussion of certain cultural aspects of the country; reading literature by well-known authors; and field trips to places of significance from the cultural perspective. These components are designed so that they complement each other. Japanese Culture B and D courses overlap in part due to the nature of rebuilding efforts taking place in the Tohoku Region.

Learning Goals

Six years after the 2011 earthquake and tsunami, the rebuilding effort continues in the Tohoku Region. Students will gain a new perspective of the culture of this nation by witnessing and taking part in some of the dynamic interactions of the old and new elements in the reconstructing process.

Course Schedule	
April 12	1. Course introduction: Fall semester review; overview of Tohoku Region
April 19	2. Rebuilding effort in Tohoku after 2011
April 22	3. Fieldwork in the coastal district of Arahama, Sendai: Visiting former Arahama Elementary School; partaking in the forestation of the tsunami embankment (Saturday)
April 26	4 . Reading : "The Bears of Nametoko," a short story by Miyazawa Kenji
May 10	5 . Manga & popular music—casual ways of expresseing the Japanese mind
May 17	6. Preparing for Shiroishi field trip; reading movie script "We are no traitors!"
May20	7. Fieldwork in Shiroishi: Visiting castle and noh theater; meeting sword-making master (Saturday)
May 27	8 . Fieldwork in Iwanuma City : Partaking in the forestation of the tsunami embankment at the Millennium Hope Hills (Saturday)
May 31	9 . Tamamushi Sadayu : Story of one last samurai
June 7	10. Living in Meiji period Japan: Reading "Separate Ways" by Higuchi Ichiyo
June 14	11. Preparing for fieldwork in Tomiya and Iwadeyama
June 17	12. Fieldwork in Tomiya and Iwadeyama: Visiting the Uchigasaki Sake Brewery and former samurai school (Saturday)
June 21	13.Reading a children's story: Examining early exposure to history
June 28	14. Student presentation
July 5	15. Student presentation
Course Grading	
Evaluation is based on class participation, weekly web forum assignments, the term paper and presentation.	
Textbook	
Course materials will be provided as handouts.	

Course Title	Japanese Culture D
Semester	Spring 2017
Credit	2
Instructor	Part-time lecturer Koji SHIDARA
E-mail	kojishidara@gmail.com
Class Hours / Period	14 :40-16 :10 Friday April 7 – July 7, 2017
Room	Kawauchi Campus (R115, International Exchange Building)

Course Objectives

An exploratory culture course, Japanese Culture D is offered for foreign students to learn about and share insights into various aspects of the living culture of Japan with some emphasis placed on the effects of the Great East Japan Earthquake of 2011 and the rebuilding effort thereafter. Students will learn not only through discussion and lecture but through actually participating in some of the large-scale rebuilding efforts taking place in the area.

Course Summary

The course comprises three basic approaches: discussion of certain cultural aspects of the country; reading literature including works related with the 2011 earthquake and tsunami; and field trips to places of significance from the cultural perspective. These components are designed so that they complement each other. Japanese Culture B and D courses overlap in part due to the nature of rebuilding efforts taking place in the Tohoku Region.

Learning Goals

Six years after the 2011 earthquake and tsunami, the rebuilding effort continues in the Tohoku Region. Students will gain a new perspective of the culture of this nation by witnessing and taking part in some of the dynamic interactions of the old and new elements in the reconstructing process.

Course Schedule	
April 7	1. Course introduction: Fall semester review; overview of Tohoku Region
April 14	2. Rebuilding effort in Tohoku after 2011
April 21	3. Coming to terms with the 2011 tsunami: Reading *Warm Hands*
April 22	4. Fieldwork in the coastal district of Arahama, Sendai: Visiting former Arahama Elementary School; partaking in the forestation of the tsunami embankment (Saturday)
April 28	5. Japan's 17th-century mission to the Vatican departs from Ishinomaki
May 12	6. Reading : *Surviving the 2011 Tsunami—100 Testimonies of Ishinomaki Area Survivors of the Great East Japan Earthquake*
May 13	7. Fieldwork in Ishinomaki: Visiting Dogenin Temple, nursery school, Sant Juan Bautista Park and tsunami-hit communities (Saturday)
May 19	8. The story of the Sendai Castle
May 26	9. Hiking the Sendai Castle grounds
May 27	10. Fieldwork in Iwanuma City : Partaking in the forestation of the tsunami embankment at the Millennium Hope Hills (Saturday)
June 2	11. Preparing for fieldwork in Tomiya and Iwadeyama
June 10	12. Fieldwork in Tomiya and Iwadeyama: Visiting the Uchigasaki Sake Brewery and former samurai school (Saturday)
June 16	13.Senryu and haiku—Finding expressions in concise phrases
June 23	14.Student presentation
July 7	15. Student presentation
Course Grading	
Evaluation is based on class participation, weekly web forum assignments, the term paper and presentation.	
Textbook	
Warm Hands, Miki Onosaki, Koji Shidara (translation), Tokyo, Pantaka, 2013 *Surviving the 2011 Tsunami: 100 Testimonies of Ishinomaki Area Survivors of the Great East Japan Earthquake*, Editorial Office of The Ishinomaki Kahoku, Tokyo, Junposha, 2014	

Course Title	Science, Technology and Industry of Japan (Contemporary Engineering Industries in Japan)
Semester	2017 Spring
Credit	2
Instructor	Emeritus Professor Yoshihito SHIGENO
E-mail	yoshihito.shigeno@gmail.com
Class Hours / Period	Friday 13:00-14:30 April 7. 2017 － July 7. 2017
Room	Kawauchi Campus (R115, International Exchange Building)

Course Objectives

This course aims at providing knowledge on the distinctive features of traditional and contemporary Japanese industries. By comparing these industries, you could reconsider and more deeply understand the Japanese society from the view of science.

Course Summary

Electric vehicle and fuel cell vehicle: The development of the electric vehicle and the fuel cell vehicle will be discussed in connection with the environmental issues. Other new technologies like a hybrid vehicle and a ultra capacitors are to be discussed.

Advanced steel: The super steel having the possibility of the revolutionary impact to the infrastructures will be discussed.

Super conductivity-magnet levitation train: The unique technology of the high speed train levitated by the superconductivity magnet being developed in Japan will be discussed. The effect to the future traffic system will be also discussed.

Katana (Japanese sword): Traditional Japanese technology of producing Katana will be introduced and its metallurgical aspects are to be discussed.

Robot (humanoid): Human like robots (humanoid) are being studied widely in Japan. The principle of walking and running with two legs and the affect of the humanoid to the society will be discussed.

Semiconductor: The process of the innovative invention of the “blue laser diode” will be discussed. The new –type LED (light emitted diode) created by using the nanotechnology that is developed in this university is introduced as well.

Learning Goals

Students learn the basis of science and technology through the simple problems provided for each topic. The relation to our society is also to be learned.

Course Schedule	
April 7	1. Guidance
April 14	2. Electric vehicle and Fuel cell vehicle I
April 21	3. Electric vehicle and Fuel cell vehicle II
April 28	4. Electric vehicle and Fuel cell vehicle III
May 12	5. Advanced steel I
May 19	6. Advanced steel II
May 26	7. Super conductivity-magnet levitation train I
June 2	8. Super conductivity-magnet levitation train II
June 9	9. Katana (Japanese Sword) I
June 16	10. Robot (Humanoid) I
June 23	11. Robot (Humanoid) II
June 30	12. Robot (Humanoid) III
July 7	13. Semiconductor I
July 14	14. Semiconductor II
July 21	15. Exam
Course Grading	
Evaluation will be based on class participation, homework assignment and the final examination.	
Textbook	
Some lecture materials are to be provided in advance of the class. VTR will be often used for better understanding of the lectures.	

Course Title	Mathematics B
Semester	2017 Spring
Credit	2
Instructor	Professor Tatsuya TATE, Assoc. Professor Yuu HARIYA Assoc. Professor Takuya YAMAUCHI
E-mail	tate@m.tohoku.ac.jp, hariya@math.tohoku.ac.jp tyamauchi@m.tohoku.ac.jp
Class Hours / Period	Thursday. 8:50—10:20, April 13, 2017—July 27, 2017
Room	Kawauchi Campus, Room C301

Course Objectives

The aim of this course is to discuss various topics on modern mathematics. Each lecturer gives 5 lectures of each topic. The outline of the course is as follows:

I. On Riemann hypothesis (Yamauchi)

II. Limit theorems in probability theory (Hariya)

III. Homology of simplicial complex and index of vector fields (Tate)

Course Summary

Course content

I. (1) We will study formulas for power sums in terms of Bernoulli number and their basic properties.

(2) We will define Riemann zeta function and study its basic properties.

(3) We will show how to extend Riemann zeta function as an analytic function on the complex plane.

(4) We will study Euler-Maclaurin formula to compute the values of Riemann zeta function.

(5) We will understand the statement of Riemann hypothesis regarding zeros of Riemann zeta function and study related topics.

II. In this middle course, we deal with several limit theorems in probability theory based on its measure-theoretic foundations introduced in Mathematics A.

(1) After recalling some necessary notions such as independence of random variables (r.v.'s), we formulate and prove the weak law of large numbers.

(2) We then introduce the strong law of large numbers and see how the convergence in weak sense (more precisely, in the sense of convergence in probability) can be strengthened as that in the sense of almost sure convergence.

(3) As an introduction to the theory of central limit theorems, we present their prototype, the so-called de Moivre-Laplace theorem, which can be proven by elementary computations involving Stirling's formula.
(4)(5) Finally we formulate and prove the central limit theorem in its full generality; for that purpose, the notion of characteristic functions of r.v.'s and some of their properties are introduced.

III. The aim of this series of lectures is to explain Poincaré-Brouwer and Poincaré-Hopf theorem about the vector fields on compact manifolds. This theorem is closely related to the notion of degree of maps which is defined by using homology theory. In the lectures,
(1) Poincaré-Brouwer theorem will be explained;
(2) the homology groups for simplicial complex and compact manifolds will be introduced;
(3) some method of computing homology groups will be explained;
(4) the degree of maps on spheres will be defined and a proof of Poincaré-Brouwer theorem will be given;
(5) finally, Poincaré-Hopf theorem, which is a generalization of Poincaré-Brouwer theorem will be explained.

Preparation for lectures
Students are assumed to be familiar with elementary multi-variable calculus and linear algebra. To attend the third series of lectures, some knowledge about manifolds will be very convenient.

Obligation
Students should attend each class and should submit some reports. Problems for reports will be given in the class.

Further study
Handouts and/or some references will be given in the lectures, which will help students to study more about the topics. Students who like to study further about the third topic of the course are deeply encouraged to read the following book:
V. Guillemin and A. Pollack, “Differential Topology”, reprint from the 1974 original. AMS Cheksea Publishing, Providence, RI, 2010.

Learning Goals

Students will be knowledgeable about various topics in modern mathematics, particularly in number theory, geometry and probability theory.

Course Schedule		
April 13	Yamauchi	1. Bernoulli numbers and power sums
April 20	Yamauchi	2. Riemann zeta function
April 27	Yamauchi	3. The analytic continuation of Riemann zeta function
May 11	Yamauchi	4. Euler-Maclaurin formula
May 18	Yamauchi	5. Riemann hypothesis
May 25	Hariya	6. The weak law of large numbers
June 1	Hariya	7. The strong law of large numbers
June 8	Hariya	8. The de Moivre-Laplace theorem
June 15	Hariya	9. Characteristic functions
June 22	Hariya	10. The central limit theorem
June 29	Tate	11. Vector fields on spheres and their properties: Poincaré-Brouwer theorem
July 6	Tate	12. Rapid course in homology theory: simplicial complex
July 13	Tate	13. Rapid course in homology theory: homology and its computation
July 20	Tate	14. Degree of maps and proof of Poincaré-Brouwer theorem
July 27	Tate	15. Poincaré-Hopf theorem and related topics
Course Grading		
The course grades will be based on attendance and reports.		
Textbook		
Textbooks are not assigned in advance. A reference is given above.		

Course Title	Inorganic Chemistry (Basic Organometallic Chemistry)
Semester	2017 Spring
Credit	2
Instructor	Associate Professor Hisako Hashimoto
E-mail	hhashimoto@m.tohoku.ac.jp
Class Hours / Period	Monday, 14:40～16:10 April 10 ~July 31
Room	Room 105 at International Exchange Building , Kawauchi-kita Campus

Course Objectives

This course is opened in Spring semester for understanding the fundamental organometallic chemistry.

The course objective is educating students to learn basic knowledges of organometallic chemistry, which is a boundary area between inorganic chemistry and organic chemistry. The contents of this course include coordination number, stereochemistry and electron counting rule for transition metal complexes, oxidation state of the metal centers, synthesis, structure, and reactivity of some typical organometallic complexes.

Course Summary

1. Basic knowledges for metal complexes (electron counting rule, oxidation state, crystal field theory, bonding nature (orbital interaction), etc.
2. Metal carbonyl complexes
3. Metal alkyl complexes
4. Dinitrogen complexes

Learning Goals

Students will learn about how to count the coordination number, electron count, oxidation state, and bonding nature of the metal complexes, and through such information, they will be able to understand or predict the structures, properties, and reactions of organometallic compounds.

Course Schedule	
4/10	1.Orientation, a level check test
4/17	2. Periodic table, structures of complexes
4/24	3. d-orbitals, crystal field theory
5/8	4.The 18-electron rule and formal oxidation state
5/15	5. Exercises for electron counting rule and oxidation state
5/22	6. Metal carbonyl complexes: synthesis, bonding
5/29	7. Metal carbonyl complexes: reactions
6/5	8. Metal carbonyl hydride complexes: oxidative addition and reductive elimination
6/12	9. Exercises for metal carbonyl complexes
6/19	10. Metal carbonyl clusters: Wades rules and isolobal relationships
6/26	11.Carbonyl related complexes
7/3	12.Dinitrogen complexes: Synthesis and application
7/10	13.Metal alkyl complexes, Bonding nature, synthesis
7/14	14.Metal-Carbon multiple bonded complexes
7/31	15. Exam
Course Grading	
Evaluation will be based on class participation, homework assignment, and short tests (or excercise) during the class.	
Textbook:	
Bochmann, Manfred, "*Organometallics 1 Complexes with Transition Metal-Carbon σ-Bonds*." Oxford science publications: 2008. ISBN 0-19-855750-7	

Geophysics

Associate Professor Naoki TERADA (teradan@pat.gp.tohoku.ac.jp)
Professor Shinji TODA (toda@irides.tohoku.ac.jp)
Associate Professor Weiming SHA (sha@wind.gp.tohoku.ac.jp)

PLACE: International Exchange Building, Room R105, Kawauchi-kita Campus
TIME: Friday 8:50-10:20

This course aims at learning the outlines of geophysics. By joining this course, students will get basic knowledge in geophysics.
The following topics, which are actively investigated at the Department of Geophysics, will be introduced. (1) Space Physics: Selected topics from solar physics, interplanetary physics, magnetospheric physics, and upper atmospheric physics for the purpose of learning basic knowledge on the electromagnetic environment of the Sun, the Earth, and planets. (2) Solid Earth Physics: Selected topics from seismology, volcanology, and plate tectonics for the purpose of learning basic knowledge on the structure and dynamics of the solid Earth. (3) Fluid Earth (atmosphere and ocean) Physics: Selected topics from meteorology, global warming, and physical climatology for the purpose of learning basic knowledge on climate change and related global environment problems.
The evaluation will be mainly based on a record of attendance, and contribution to discussions.

●Each Friday from April 7 through May 12.
Lectures on Space Physics will be given by Associate Prof. Terada.
Material for the lecture will be prepared by Associate Prof. Terada.

●Each Friday from May 19 through June 16.
Lectures on Solid Earth Physics will be given by Prof. Toda.
Material for the lecture will be prepared by Prof. Toda.

●Each Friday from June 23 through July 21.
Lecture on Fluid Earth will be given by Associate Prof. Sha.
Material for the lecture will be prepared by Associate Prof. Sha.

Molecular and Cellular Biology (Spring2017)

Contact address; kogane@m.tohoku.ac.jp (Assoc. Prof. Koganezawa)
sci-sien@grp.tohoku.ac.jp (Student Support Section, School of Science)

Place; Room 105 at International Exchange Building, Kawauchi-kita Campus
Time; 10:30 – 12:00 every Friday

This course offers an introduction to biochemistry, genetics, cell biology, early development, and neurobiology; emphasis on the cell as the basic unit of life; its composition, functions, replication, and differentiation. For evaluation, students are required to attend the class, and must submit an essay dealing with a topic covered in one of the lectures.

01. APRIL 14(FRI) ASAKO SUGIMOTO
Dynamic cellular behaviors in embryogenesis

02. APRIL 21(FRI) GAKU KUMANO
Germline cell development in animal embryos

03. MAY 12 (FRI) RYUSUKE YOKOYAMA
Molecular biology of plant

04. MAY 19 (FRI) KOJI TAMURA
Pattern formation in vertebrates

05. MAY 26 (FRI) KENTARO ABE
Development of the nervous systems

06. JUNE 2 (FRI) KEN-ICHRO TSUTSUI
Investigation of the brain function by neurophysiological methods

07. JUNE 9 (FRI) HIROMU TANIMOTO
Reward, punishment, and neural circuits

08. JUNE 16 (FRI) JUNKO KYOZUKA
Pattern Formation in Plants

09. JUNE 23 (FRI) MITSUNORI FUKUDA
Membrane dynamics in cells

10. JUNE 30 (FRI) ERINA KURANAGA
Collective cell movement in epithelial morphogenesis

11. JULY 7 (FRI) MASAYUKI KOGANEZAWA
Neural mechanisms of courtship behavior

Course Title	Evolution of the Western Pacific Island Arcs and Their Environments
Semester	2017 Spring
Credit	2
Instructor	Assoc. Prof. Jun Muto (correspondence) Profs. Toshifumi Imaizumi, Kunio Kaiho, Yasufumi Iryu, Hiroyuki Nagahama, Hiroshi Nishi and others
E-mail	jun.muto.a3@tohoku.ac.jp
Class Hours / Period	Tuesday, 10:30 ~ 12:00
Room	Room 105 at International Exchange Building , Kawauchi-kita Campus

Course Objectives

In this lecture course, students will learn some basic concepts and knowledge of 1) plate tectonics and 2) the tectonic history of the world including Japan Islands, 3) active faults and earthquakes, 4) ocean environments and their history. Also, this class deals with 5) the effect of the Western Pacific island arcs and Japan Sea to the Asian monsoon circulation.

Course Summary

This course aims at presenting some basic concepts and information of plate tectonics and the tectonic history of the Asiatic continent and the Japanese islands, active faults and earthquakes, ocean environments and their history, and climate. The lectures include the problems how natural hazard and earth’s environmental changes affect the living world and human life.

Learning Goals

The students can understand multidisciplinary aspects of the Western Pacific/Northeast Asian regions through the case studies referred frequently in these lectures (points 1 to 5 mentioned above).

Course Schedule	
April 11	Muto, J.: Introduction of the class
April 18	Osozawa, S: Geology and morphology of Kawauchi and Hirose river area (outside small field trip)
April 25	Muto, J.: Rheology of rocks and subduction zone earthquake cycles
May 9	Toda, S.: Earthquake triggering
May 16	Imaizumi, T.: Earthquakes and active faults
May 23	Nagahama, H.: Faulting and electro-magnetic phenomena
May 30	Hirano, S.: Active faults in Japan
June 6	Goto, K. : Lessons learned from the 2011 Tohoku-oki tsunami
June 13	Takashima, R.: Greenhouse paleoenvironments
June 20	Kaiho, K.: Triggers and process of macroevolution and mass extinctions
June 27	Sasaki, O.: Looking back of life
July 4	Nishi, H.: Climate change during the past 200 Myr
July 11	Isoda, Y.: The Great East Japan Earthquake
July 18	Iryu, Y.: Geology and biogeography of the Ryukyu Islands
Course Grading	
The evaluation will be based on the attendance and submitted report. Submit a report on a selected subject from the lectures until July 28. Detail on grading will be announced in the first lecture on April 11.	
Textbook	

Subject	Introduction to Resource and Environmental Economics	Day/Period	Thur./2nd Apr. 13 – Aug. 3, 2017	Object	AMB/JYPE
Instructor (Post)	S. KITANI, *et al.* (Prof.)	Categories	Specialized Subjects	Preferable Participants	3rd&4th-year & JYPE students
Position	Faculty of Agriculture (Graduate School of Agricultural Science)			Credits	2
				Semester	7&9
Subject Numbering	ABS-APS359E			Language	English

1. Class subject : **Resource and Environmental Economics**

2. Object and summary of class This class object is to study the concepts of Resource and Environmental Economics. Ten Professors, Associate Professors and Assistant Professors will give the lectures weekly.

3. Keywords agricultural economics, remote sensing, food business, environmental conservation, agricultural ethics

4. Goal of study The goal of this class is to obtain the background knowledge concerning Resource and Environmental Economics as well as the basic principles of Agricultural Economics, Farm Management Science, Remote Sensing and Life Cycle Assessment of Goods.

5. Contents and progress schedule of class

-Guidance (Head of department)

- Readings an annual report of food, agriculture and rural village in Japan (Head of department)
An annual report of Japanese MAFF shows the outline of food, agriculture and rural village in Japan.

-Rural Development and Agricultural Economics (Assistant Professor Nina TAKASHINO)
This lecture provides an overview on rural development issues.

-Agricultural policy and environmental issues (Associate Professor Keiichi ISHI)
This lecture will examine trends of agricultural policy integrating environmental problems.

-Recent Situation of Japanese Agriculture and Global Food Production (Professor Kiyohide MORITA)
World food supply and demand has changed dramatically in 21th Century. We explain its causes like emerging economies' economic growth and expanding use of agricultural products for biofuels, and its implication. And also we study agricultural structural problems of Japan like too small farming.

-Trends of Japanese food consumption and consumer's behavior (Professor Fusao ITO)
In this class, recent characteristics of change in Japanese food consumption will be showed. Students will be able to learn some problems of Japanese future food market.

-Environmental friendly oriented agriculture in Japan (Assistant Professor Asato MIZUKI)
This lecture will cover an outline of environmental friendly agriculture in Japan and provide students concepts of economic evaluation and environmental assessment concerning it.

-Agribusiness in Japan (Associate Professor Katsuhito FUYUKI)
Farmer's income comprises not only agricultural income. Japan's government should support promoting agriculture production-related businesses, such as the processing of farm products by farmers themselves. In this lecture, statistical data and other information of such businesses will be introduced

-Spatial science in agriculture (Associate Professor Chinatsu YONEZAWA)
Introduction of remote sensing and geographical information science (GIS) for agricultural application. Spatial thinking is an important and powerful agricultural problem solving tool.

-Environmental impact assessment/environmental policy (Assistant Professor Michiaki OMURA)
Life cycle assessment for agricultural activities

-Agricultural ethics and environmental problems (Assistant Professor Shin OYAMADA)
What should the relationship between agriculture and environment be? In this lecture students study the values of environment in the perspective of agricultural ethics.

-What is environmental risks？(Professor Shinobu KITANI)
The lecture shows you the difference between usual risks and environmental ones, and hope for students' consciousness of importance of environmental ethics.

-Compatibility between conservation of nature and tourism (Associate Professor Tomoko IMOTO)
With nature tourism, an appropriate balance between conservation and development can lead to economic growth. We explore possible ways to reduce the impact of tourism on nature using land-use classification and economic evaluation of nature.

-Creation of the report (Head of department)

6. Preparation : nothing special

7. Record end evaluation method : Attendance to the lectures 50%, reports 50%

8. Textbook and references : Textbook and references will be introduced by each professor.

9. Self study : nothing special

10. In addition

Subject	Applied Biological Chemistry	Day/Period	Fri./2nd Apr. 7 – Aug.4, 2017	Object	AMB/JYPE
Instructor (Post)	T. UCHIDA, et al (Prof.)	Categories	Specialized Subjects	Preferable Participants	3rd&4th-year & JYPE students
Position	Faculty of Agriculture (Graduate School of Agricultural Science)			Credits	2
				Semester	7&9
Subject Numbering	ABC-AGC261E			Language	English

1. Class subject: **Life science for agricultural and industrial applications**

2. Object and summary of class : This class object is to study fundamentals and recent progress in the research-field of molecular biology, cell biology, and physiology in plants, animals, and microbes, and chemistry of biologically active natural products. More than ten Professors and Associate Professors will give the lectures weekly to introduce their specific research fields.

3. Keywords: Biochemistry, Molecular Biology, Chemistry

4. Goal of study

The goal of this class is to obtain the background knowledge concerning life science for agricultural and industrial applications as well as the basic principles of biochemistry and biotechnology.

5. Contents and progress schedule of class

1. **Photosynthesis and mineral nutrients of higher plants**
   Students will learn about the photosynthetic oxygen evolution and mineral nutrition in higher plants.
2. **Molecular Genetics and Brain Science**
   Methodological advance in molecular biology and molecular genetics fields has contributed to recent brain science with a huge impact. I will try to demonstrate this fascinated field to the attendee of the class.
3. **Enzymology**
   Topics in enzymes with emphasis on association with health, environment and food will be discussed.
4. **Applied microbiology and fermentation technology**
   Microorganisms possess a wide variety of metabolism and thus are applied to bio-conversion in fermentation industry. This lecture will address both transport processes (substrate-uptake and product-efflux) catalyzed by solute transporters at cell membranes and intracellular metabolic pathways from the view points of bioenergetics in microorganisms. We will also lecture on the principles of protein production technology by bacteria.
5. **Synthesis and application of bioactive natural products**
   This lecture will be presented to build basic understanding of synthetic organic chemistry in the filed of natural products chemistry and its roles in agricultural production, medicinal chemistry, and so on.
6. **Molecular basis of nitrogen metabolism in rice**
   In this lecture, molecular mechanisms underlying the primary ammonium assimilation and the related processes in rice will be introduced.
7. **Molecular eukaryotic microbiology**
   Eukaryotic microorganisms such as yeasts and filamentous fungi have been playing a pivotal role in academic science as well as in industrial production of valuable substances. This lecture will give an overview of molecular analysis of the important characteristics of yeast and koji-mold, which each has been used in sake fermentation for over a thousand years in Japan.

6. Preparation: Textbooks and references will be introduced by each professor.

7. Record end evaluation method : Attendance to the lectures 50%, reports 50%

8. Textbook and references: Textbooks and references will be introduced by each professor.

9. Self study: Textbooks and references will be introduced by each professor.

10. In addition

1. Professor Amane MAKINO, Associate Professor Hiroyuki ISHIDA
2. Professor Katsuhiko NISHINORI, Associate Professor Masahiko HARATA
3. Professor Takafumi UCHIDA, Associate Professor Eugene FUTAI
4. Professor Keietsu ABE, Associate Professor Jun KANEKO
5. Professor Shigefumi KUWAHARA, Associate Professor Masaru ENOMOTO
6. Professor Mitsue MIYAO, Associate Professor Toshihiko HAYAKAWA
7. Professor Katsuya GOMI, Associate Professor Takahiro SHINTANI

Course Title	Materials Science and Engineering B
Semester	2017 Spring
Credit	2
Instructor	Prof. Katsunari OIKAWA, Prof. Hongmin ZHU Assoc. Prof. Takahiro MIKI
E-mail	k-oikawa@material.tohoku.ac.jp hzhu@material.tohoku.ac.jp, miki@material.tohoku.ac.jp
Class Hours / Period	13:00-14:30 Tuesday / April 11,2017 - July 18,2017
Room	Lecture Hall, Materials Science and Engineering

Course Objectives

"Materials Science and Engineering B" is a half year class to learn the fundamentals of the "Materials Processing" based on the high temperature physical chemistry and process engineering. This class basically consists of three parts as thermodynamics for materials processing, ferrous and process metallurgy （iron- and steel-making）, nonferrous metallurgy （pyro- and hydro-metallurgy）, and electro-metallurgy in active metal processing. Students can study fundamentals and latest topics in the area of materials processing and engineering. The grade of students will be evaluated with the score of home works, class participation, exercises during the class and the final examination.

Course Schedule	
April 11	1. Guidance
April 18	2. Introduction to chemical thermodynamics for materials processing I
April 25	3. Introduction to chemical thermodynamics for materials processing II
May 2	4. Reduction/Oxidation equilibrium for materials
May 9	5. Stability diagrams and phase diagrams of materials
May 16	6. Basic principle of iron and steel making.
May 23	7. Fundamentals of pyrometallurgy I
May 30	8. Fundamentals of pyrometallurgy II
June 6	9. Application of pyrometallugry（Copper making）
June 13	10. Application of pyrometallugry（Zinc, Lead production）
June 20	11. Fundamental electrochemistry in metallurgy
June 27	12. Application of hydrometallurgy
July 4	13. Aluminum and active metal production I
July 11	14. Aluminum and active metal production II
July 18	15. Final examination

Course Title	Computer Software Engineering
Semester	2017 Spring
Credit	2
Instructor	Assoc. Professor Hideaki Goto
E-mail	hgot@cc.tohoku.ac.jp
Class Hours / Period	Tuesday, 8:50-10:20 April 11, 2017 – July 18, 2017
Room	Kikai Lecture Room 1, Division of Mechanical Engineering, Aoba-yama Campus

Course Objectives

This course will give students the basic knowledge about Algorithms and Data Structures.

Course Summary

Evaluation methods and programming techniques for making good programs will be discussed in the lecture style. Three or four assignments and the final exam will be given. The grade will come from in-class final exam (30%) and two or three assignments (70%). The final exam might be changed to an additional assignment.

Learning Goals

Students will have the ability of designing and making good programs.
(Programming in a particular language is not included.)

Course Schedule	
April 11	1.Introduction of the course, Computation and Algorithms
April 18	2.Evaluation of computational complexity
April 25	3.Data structures, Abstract Data Types (ADTs)
May 2	4. Basic data structures : array, list
May 9	5. Basic data structures : stack, queue
May 16	6. Basic data structures : graph, tree
May 23	7. Basic data structures : set, table (dictionary), hashing
May 30	8. Priority queue, heap
June 6	9. Binary search tree and Balanced search tree
June 13	10. Sorting : bubble sort, shell sort, bucket sort, radix sort, insertion sort
June 20	11. Sorting : heap sort, quick sort, merge sort
June 27	12. Graph searching : breadth-first search, depth-first search
July 4	13. Graph algorithms : minimum spanning tree, shortest path problem
July 11	14. Optimization problems
July 18	15.* Final Examination
Note	
1) Students have to do all the assignments and take the final exam. 2) Although high programming skill of a particular language is not required, students need to have some knowledge about a programming language, preferably C or Java. 3) The contents of this program are subject to change.	
Textbook	
Handouts will be given. Thomas A. Standish, “Data Structures in Java," Addison-Wesley (1997) as a reference text.	

Course Title	Fundamentals of Computer Engineering
Semester	2017 Spring
Credit	2
Instructor	Hiroaki Kobayashi, Professor, Graduate Scool of Information Sciences
E-mail	koba@tohoku.ac.jp
Class Hours / Period	Monday, 13:00-14:30 April 10,2017 – July 24,2017
Room	Room 213 of Mechanical Engineering Building No.2, Kikai-Chinou, School of Engineering, Aobayama Campus

Course Objectives

In this course, students should be able to:
(1) know the concept of today's computers based on the history of computers development,
(2) learn data representation for computers and the mathematical foundation of computer arithmetic, and
(3) understand the concrete structure and functionality of modern computer systems through their basic components of arithmetic unit, memory and control unit as building blocks in terms of hardware and software.

Course Summary

After the quick revew of computer systems development in the history, the course gives the mathematical foundation for computer system design. Based on the mathematical fundaton, the design methodology of basic circuits such as combinational circuits and sequential circuits is given. And then, the course describes how a computer system is constructed by using several basic combinational and sequential circuits, and discusses its functionality to carry out arithmetic and logic operations. In addition, the format of a machine language to direct operations to the computer system and its interpretation to generates control signals will be presented.

Learning Goals

As the lerning goal, students have aquired the knowledge of circuit design and organization of modern computer systems.

Course Schedule	
April 10	1) Course Introduction, and History and Fundamentals of Computers
April 17	2) Number Representation: Binary Digit (Part I)
April 24	3) Number Representation: Binary Digit (Part II)
May 1	4) Boolean Algebra (Part I)
May 8	5) Boolean Algebra (Part II)
May 15	6) Combinational Logic and it Applications (Part I)
May 22	7) Combinational Logic and it Applications (Part II)
May 29	8) Sequential Logic: Basics (Part I)
June 5	9) Sequential Logic: Basics (Part II)
June 12	10) Sequential Logic: Applications (Part I)
June 19	11) Site Visit to Supercomputer Center of Tohoku University
June 26	12) Sequential Logic: Applications (Part II)
July 3	13) Organization of Computer Systems
July 10	14) Control Mechanism of Computer Systems
July 24	15) Final Examination
Textbook	
David A Patterson and John L. Hennessy, Computer Organization & Design: The Hardware/Software Interface, Morgan Kaufmann, November, 2011.	

Course Title	Electricity and Magnetism B
Semester	2017 Spring
Credit	2
Instructor	Associate Professor Mark Sadgrove
E-mail	mark@riec.tohoku.ac.jp
Class Hours / Period	Friday, 8:50-10:20, starting from April 7th, 2017
Room	Room 2-413 (Building D12, 4F, Seminor Room 413) Department of Electrical, Information and Physics Engineering, Aobayama Campus

Course Objectives

The objectives of this course include:

1) Understanding of and ability to apply Maxwell's equations to the creation and propagation of electro-magnetic waves.

2) Understanding of and ability to solve problems regarding electro-magnetic fields in matter.

3) Understanding of electromagnetic induction.

Course Summary

This course E&M B is the second half of a one year-long course on the foundations of the theory of electricity and magnetism: "Electricity and Magnetism A" (E&M A) and "Electricity and Magnetism B" (E&M B). First, a review of E&M A will be given. Maxwell's equations will be derived to introduce the propagation of electromagnetic plane waves and the radiation of electromagnetic waves. Electric and magnetic fields in matter, along with electromagnetic induction will also be studied.

Learning Goals

By the end of the course, students should understand Maxwell's equations especially in relation to the propagation of electromagnetic plane waves and the radiation of electromagnetic waves. Electric and magnetic fields in matter, and electromagnetic induction should also be understood. Students should also have the ability to solve simple problems in the above topics.

Course Schedule	
April 7	1. Review of Electricity and Magnetism A, I
April 14	2. Review of Electricity and Magnetism A, II
April 21	3. Maxwell's equations and electromagnetic plane wave in vacuum
April 28	4. Electromagnetic plane waves in vacuum and matter
May 12	5. Reflection and transmission of plane wave at planar boundary between two media
May 19	6. Radiation of electromagnetic waves
May 26	No class (Field day of Faculty of Engineering)
June 2	7. Radiation of electromagnetic wave by an electric dipole
June 9	8. Electromagnetic induction (Faraday's law)
June 16	9. Dielectric materials and electric dipole moment
June 23	10. Polarization, dielectric constant and capacitors
June 30	11. Boundary conditions at two different dielectric media
July 7	12. Boundary conditions at two different magnetic media
July. 14	13. Nonlinear media; ferromagnetism and magnetic circuit
July. 21	14. Magnetic dipole and magnetization current
July 28	Final Exam
Textbook	
There is no set text. Many textbooks cover the topics in the including: E. M. Purcell, Electricity and Magnetism (Berkeley, Volume 2), D. J. Griffiths, Introduction to Electrodynamics (2nd ed.), R. P. Feynman, The Feynman Lectures on Physics (Volume 2), J. D. Jackson, Classical Electrodynamics (2nd ed.), J. A. Edminister, Electromagnetics (2nd ed.)	

Course Title	Chemical and Biomolecular Engineering I
Semester	2017 Spring
Credit	2
Instructor	Prof. Yuji MATSUMOTO Prof. Nobuhiko IKI Prof. Daisuke NAGAO Assoc. Prof. Masaki KUBO Assoc.Prof.Yoshiyuki SATO Assoc.Prof.Yoshinao NAKAGAWA Assoc. Prof. Fabio PICHIERRI
E-mail	y-matsumoto@tohoku.ac.jp
Class Hours / Period	10:30-12:00, Thursday April 13,2017 - July 20,2017
Room	Room “Kasho”, Department of Applied Chemistry, Chemical Engineering and Biomolecular Engineering, Aobayama Campus

Course Objectives

We are surrounded by a large number of chemical products manufactured with various types of materials including organic, inorganic and their composite materials. Even in our body, biological materials are constantly being produced using a variety of chemical and biochemical reactions. The present course objectve is to provide chemistry-oriented topics in developing such functional materials in various areas.

Course Summary

This course is opened in Spring semester for understanding chemical and biomolecular engineering. Various topics will be presented by different instructors, as listed in the course schedule below, each instructor giving a series of two lectures for each topic.

Learning Goals

Students will learn some basic aspects of chemical production, with special emphasis on how environment-friendly synthetic methodologies of materials have been developed for new advanced products.

Course Schedule	
April 13	1. Chemistry of materials processing in vacuum by Prof. Yuji MATSUMOTO 1-1. Basic vacuum technology for materials processing
April 20	1-2. Vacuum deposition techniques of inorganic and organic thin film materials
April 27	2. Chemical functions of coordination compounds by Prof. Nobuhiko IKI 2-1. Basic concepts of coordination chemistry
May 11	2-2. Applications to functional materials and biomedicine
May 18	3. Chemistry of composite materials in wet processing by Prof. Daisuke NAGAO 3-1. Wet chemical processing for composite particles and thin films
May 25	3-2. Controls over sizes and morphologies of composite particles
June 1	4. Particle dynamics in nanofluids by Assoc. Prof. Masaki KUBO 4-1. Aggregation / dispersion of particles
June 8	4-2. Aggregation kinetics and colloidal dynamics
June 15	5. Thermophysical Properties of Polymers and Polymer Solutions by Assoc. Prof. Yoshiyuki SATO 5-1. Volumetric Properties of Polymers
June 22	5-2. Phase Equilibria of Polymer Solutions
June 29	6. Catalytic production of chemicals from biomass by Assoc. Prof. Yoshinao NAKAGAWA 6-1. Production of pure platform chemicals from biomass
July 6	6-2. Conversions of biomass-derived platform chemicals
July 13	7. Chemistry of Carbon Nanomaterials by Assoc. Prof. Fabio PICHIERRI 7-1. Structure and bonding in organic molecules
July 20	7-2. Fullerenes, carbon nanotubes and graphene
Course Requirements	
Knowledge on fundamental chemistry is required	
Student Evaluation	
Examinations and/or reports, depending on topics. No make-up exam.	
Textbook	
None.The handout and/or prints will be delivered by each instructor in his/her class	

Course Title	Chemical and Biomolecular Engineering II
Semester	2017 Spring
Credit	2
Instructor	Prof. Hitoshi SHIKU Prof. Tomokazu MATSUE, Associate Prof. Seiji TAKAHASHI Associate Prof. Masato NOGUCHI Associate Prof. Masaru WATANABE Associate Prof. Yasuhiro FUKUSHIMA Associate Prof. Naoya MOROHASHI
E-mail	shiku@bioinfo.che.tohoku.ac.jp
Class Hours / Period	13:00-14:30, Wednesday April 12,2017 – Aug 2,2017
Room	Room “Kasho”, Department of Applied Chemistry, Chemical Engineering and Biomolecular Engineering, Aobayama Campus

Course Objectives

Biomolecular engineering refers to any technological applications of chemical and biological systems, such as biomolecules and environmental materials to make or modify products or green processes for specific purposes. This class focuses on biomaterials, biomedical engineering, metabolic engineering, glycochemistry, environmentally benign materials and reactions, green process and life cycle assessment. Students will learn some basic aspects of engineering for biotechnology, biological and environmental materials.

Course Summary

Students will learn about basics and recent topics concerning biomaterials, sensors, metabolic engineering, glycosylation reaction, transformation of biomass, sustainability aspects of process technologies, and environmentally benign materials and reactions.

Learning Goals

Ability to learn skills summarizing the essence of the biological and environmental systems from the chemical and engineering sight of view.

Course Schedule	
April 12	1. Biomaterials and cell culture (by Prof. Hitoshi Shiku) 1-1. Cell culture and embryology
April 19	1-2. Tissue engineering and biomaterials
April 26	2. Biomedical engineering and Biosensors (by Prof. Tomokazu MATSUE) 2-1. Basics of Bioelectrochemistry
May 10	2-2. Biosensor technology
May 17	3. Plant specialized metabolites (by Associate Prof. Seiji TAKAHASHI) 3-1. Basic sciences and histories of use
May 24	3-2. Metabolic engineering for production of valuable metabolites
May 31	4. Carbohydrate chemistry (by Associate Prof. Masato NOGUCHI) 4-1. Principles of carbohydrate chemistry
June 7	4-2. Chemical glycosylation reaction
June 14	5. Transformation of biomass molecules in green solvents (Associate Prof. Masaru WATANABE) 5-1. Hydrothermal water process
June 21	5-2. Ionic liquid-based green solvents
June 28	6. Chemical Systems Engineering (by Prof. Yasuhiro FUKUSHIMA) 6-1. Basics in evaluating sustainability aspects of process technologies
July 5	6-2. A case study on integrated biological, agricultural and chemical process systems design
July 12	7. Development of environmentally benign materials and reactions (by Associate Prof. Naoya MOROHASHI) 7-1. Host–guest chemistry and separation materials using host molecules
Aug 2	7-2. Development of carboxylation reactions with carbon dioxide
Course Grading	
Students will be evaluated based on: class attendance, examinations and/or reports depending on topics. No make-up exam. Students require knowledge of organic chemistry and biochemistry.	
Textbook	
No text book	

Course Title	Geological Environment and Earthquake Disaster
Semester	2017 Spring
Credit	2
Instructor	Professor Masato Motosaka, Assoc. Prof. Susumu Ohno
E-mail	motosaka@archi.tohoku.ac.jp
Class Hours / Period	8:50-10:20 on Thursday April 13,2017 – July 6,2017
Room	Civil Engineering and Architecture, Lecture Room 103

Course Objectives

It is clear through past disastrous earthquakes that the earthquake damage is quite different depending on the geological conditions. The earthquake observation explains this truth. Therefore, it is important to take into account the difference of ground motion due to soil conditions in a seismic design of urban structures and in urban disaster prevention planning. This course comprises the lectures, students' presentations and discussions on engineering topics for earthquake disaster prevention considering geological environment. In each lecture, the relevant material will be handed out. In this course, two reports are requested and students make presentation based on the materials of the task during classes. The evaluation will be based on the reports and presentations for the requested subjects.

Course Schedule	
April 13	1.Introduction to Earthquake and Building Structures
April 20	2.Recent Earthquake Damage and Lessons (I)
April 27	3.Recent Earthquake Damage and Lessons (II)
May 11	4.Students' presentation on the 1st Report and Discussion
May 18	5.Measurement of Ground Motion and Structural Vibration
May 25	6.Overview of Geological Structure and Ground Motion Characteristics
June 1	7.Introduction to Wave Propagation Theory and Structural Vibration
June 8	8.Structural Health Monitoring
June 15	9.Earthquake Damage Prediction －Natural and Social Information－
June 22	10.Seismic Protection Technology －Earthquake Early Warning System－
June 29	11.Recent Topics on Earthquake Disaster Prevention Projects
July 6	12.Students' presentation on the 2nd Report and Discussion

JYPE 2017 Spring Timetable

<table>
<tr><th></th><th>I
8:50～10:20</th><th>II
10:30～12:00</th><th>III
13:00～14:30</th><th>IV
14:40～16:10</th></tr>
<tr><td rowspan="4">Mon</td><td colspan="2">Japanese 1</td><td rowspan="2">Fundamentals of Computer Engineering</td><td rowspan="2">Inorganic Chemistry</td></tr>
<tr><td colspan="2">Japanese 2</td></tr>
<tr><td colspan="2">Japanese 3</td><td colspan="2" rowspan="2">Individual Research Training B</td></tr>
<tr><td colspan="2">Japanese 4</td></tr>
<tr><td rowspan="2">Tue</td><td rowspan="2">Computer Software Engineering</td><td rowspan="2">Evolution of the Western Pacific Island Arcs & Their Environments</td><td>Matetirals Science & Engineering B</td><td></td></tr>
<tr><td colspan="2">Individual Research Training B</td></tr>
<tr><td rowspan="4">Wed</td><td colspan="2">Japanese 1</td><td rowspan="2">Chemical & Biomolecular Engineering II</td><td rowspan="2">Japanese Culture B</td></tr>
<tr><td colspan="2">Japanese 2</td></tr>
<tr><td colspan="2">Japanese 3</td><td colspan="2" rowspan="2">Individual Research Training B</td></tr>
<tr><td colspan="2">Japanese 4</td></tr>
<tr><td rowspan="2">Thu</td><td>Mathematics B</td><td>Chemical & Biomolecular Engineering I</td><td colspan="2" rowspan="2">Individual Research Training B</td></tr>
<tr><td>Geological Environment & Earthquake Disaster</td><td>Introduction to Resource & Environmental Economics</td></tr>
<tr><td rowspan="2">Fri</td><td>Geophysics</td><td>Molecular & Cellular Biology</td><td>Science, Technology & Industry of Japan</td><td>Japanese Culture D</td></tr>
<tr><td>Electricity & Magnetism B</td><td>Applied Biological Chemistry</td><td colspan="2">Individual Research Training B</td></tr>
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