

<1> History and Human Society

Object: FGL. Language: E

Course Code: CB31224. Fall, Wed/1st (2 credit) .

Instructor: Manabu NAKAGAWA (Institute for Excellence in Higher Education)

1. Class Subject

History of Tohoku University

2. Object and Summary of Class

What sort of a university is Tohoku University?

This course covers the history of Tohoku University to help students understand the characteristics of this University from a historical perspective.

3. Goal of Study

The goal is for each of you to acquire the following knowledge and abilities through this course.

- (1) To be able to understand and explain Tohoku University's history by using some concrete example.
- (2) To be able to survey and describe the features of your university, department and laboratory from a historical point of view.

4. Contents and Progress Schedule

This course is centered on a lecture and a field trip. The contents and schedule are as shown below:

- (1) Introduction
- (2) Field trip (Sendai City Museum)
- (3) The Foundation of Tohoku Imperial University
- (4) Field trip (University Museum)
- (5) Open Door Policy
- (6) Development of University I
- (7) Development of University II
- (8) Student Life
- (9) Field trip (University Library)
- (10) International Students
- (11) World War II and Postwar Reforms
- (12) Field trip (University Archives)
- (13) University Campus
- (14) University Reforms
- (15) University Ideals

5. Evaluation Method

Half of your grade will be based on attendance and understanding of the course (Minute Paper*, 50%), while the other half will be based on the final report (50%).

*Students will be requested to complete the Minute Paper at the end of

the class.

A student absent more than 5 sessions will not be given any credit.

6. Textbook and References

No textbooks will be used. References are handed out at every class.

7. URL

8. Preparation and Review

Students will be requested to write a short essay after each field trip.

Students will be requested to write the final report at the end of the semester.

9. In Addition

You must attend the first class session.

The maximum number of participants for this course is 40 due to the circumstances of field trip. If there are more applicants than quota, participants will be selected by lottery.

Office hours are from 13:00 to 16:00 on Wednesday. Make an appointment in advance via e-mail or other means.

<2> An Introduction to Information Science B

Object: FGL. Language: E

Course Code: CB11205. Fall, Mon/1st (2 credit) .

Instructor: Diez Donoso Santiago

1. Class Subject

Information basics B

2. Object and Summary of Class

An introductory course to acquire the university-level academic skills through information science and technology, as well as the social skills required to be a responsible citizen in the information society.

3. Goal of Study

Successful course participants will learn to utilize the information technology for intellectual and productive activities, to find ways to solve problems logically in terms of computer science, and to raise awareness about the modern issues of science and technology in the human society as a responsible citizen.

4. Contents and Progress Schedule

1. Orientation
2. Basics usage of information systems
3. Academic skill I (Basics of intellectual production assisted by information technology, part 1)
4. Academic skill I (Basics of intellectual production assisted by information technology, part 2)
5. Academic skill I (Basics of intellectual production assisted by information technology, part 3)
6. Academic skill I (Basics of intellectual production assisted by information technology, part 4)
7. Academic skill II (Computational thinking, part 1)
8. Academic skill II (Computational thinking, part 2)
9. Academic skill II (Computational thinking, part 3)
10. Academic skill II (Computational thinking, part 4)
11. Academic skill II (Computational thinking, part 5)
12. Academic skill II (Computational thinking, part 6)
13. Academic skill II (Computational thinking, part 7)
14. Academic skill II (Computational thinking, part 8)
15. Academic skill II (Computational thinking, part 9)
16. Academic skill II (Computational thinking, part 10)

5. Evaluation Method

Homework assignments (1 or 2 times): 80-100%

Participation in class: at most 20%

6. Textbook and References

7. URL

8. Preparation and Review

Students are required to submit homework assignments.

9. In Addition

Course materials will be distributed with a web-based information service called ISTU.

Details about the service will be instructed in the course.

<3> Physics A

Object: FGL. Language: E

Course Code: CB24258. Fall, Tue/4th (2 credit) .

Instructor: Takeshi KOIKE (Institute for Excellence in Higher Education)

1. Class Subject

Introductory Physics

2. Object and Summary of Class

This course is intended for students without any or little background in physics and calculus. Through Newtonian mechanics, important concepts in physics such as force, momentum, energy, angular momentum, and laws of conservation will be introduced. In addition, how these concepts are described in the language of mathematical equations, in particular, using calculus will be explored.

3. Goal of Study

By the end of the course, you are expected to gain familiarity with Newton's laws of motion, momentum, and energy, and angular momentum as well as their conservation properties. In addition, you are expected to be able to draw a free-body diagram, derive an equation of motion, and solve it using simple vector algebra and calculus.

4. Contents and Progress Schedule

Schedule of the course:

0. Orientation to WileyPlus + ORION system and the course survey
1. Introduction and Ch1: Measurement (unit)
2. Ch2: Motion Along a straight line (acceleration and free fall)
3. Ch3: Vectors
4. Ch4: Motion in Two and Three Dimensions (Projectile motion under uniform gravity)
5. Ch4: Motion in Two and Three Dimensions (Uniform circular motion, and relative motion)
6. Ch5: Force and Motion I (Newton's law of motion)
7. Ch5 and Ch6: Force and Motion I & II (free body diagram, frictional force, and centripetal force)
- Midterm examination (Ch1-Ch6)
8. Ch7: Kinetic Energy (transformation and transfer of energy, work, work done by gravity, work done by spring, and power)
9. Ch7: Kinetic Energy (transformation and transfer of energy, work, work done by gravity, work done by spring, and power)
10. Ch8: Potential Energy (isolated system, conservation of energy, conservative force and potential energy)
11. Ch9: Center of Mass (a system of particles, center of mass, conservation of total momentum of a system)
12. Ch10: Rotation (correspondance between linear and angular motion,

moment of inertia, angular momentum)

13. Review and course survey

Final examination (Lecture 7-10)

5. Evaluation Method

Evaluation will be based on a midterm exam (25%), final exam (25%), homework assignments (20%), attendance (10 %), reading assignment and self-practice with ORION system (20%).

6. Textbook and References

Fundamentals of Physics Extended, 10th Edition David Halliday, Robert Resnick, Jearl Walker Wiley 2013 textbook

7. URL

<https://www.wileyplus.com/>

8. Preparation and Review

This course requires purchase of the WileyPlus system which costs \$40 USD. The system includes an electronic version of the required textbook with many integrated features to facilitate understanding of the subjects and problem solving skill in physics. The system also comes with a self-diagnostic tool, ORION, with which one will practice problem solving based on his/her own proficiency in each chapter that will be covered in the course. Access to internet is necessary outside of the class. Registration to the WileyPlus and payment method will be announced in the orientation in the first lecture.

9. In Addition

If you are planning to take Physics B or/and C, you must register for another Physics A (ZDN-PHY11E), which is targeted for chemistry and engineering majors with highschool-level physics and calculus background. Survey of conceptual understanding of the subject will be conducted at the first and last lecture to assess the effectiveness of the instructional method.

<4> Physics A

Object: FGL. Language: E

Course Code: CB54209. Fall, Fri/4th (2 credit) .

Instructor: Takeshi KOIKE (Institute for Excellence in Higher Education)

1. Class Subject

Classical Mechanics

2. Object and Summary of Class

This is an introductory course to Newtonian mechanics, but also serves as an introduction to the way we try to understand various natural phenomena encountered in Physics B (oscillations and waves, fluid dynamics) and Physics C (electromagnetism). Mechanics deals with motion of a physical body as well as response to forces applied to the body. The mechanics we study in this course is applicable to an object or system of particles that is slow moving in comparison to the speed of light (non relativistic) and large enough in physical scale as to be unaffected by quantum fluctuations, hence the name "classical".

3. Goal of Study

By the end of the course, you are expected to gain familiarity with and obtain basic understandings of Newton's laws, work and energy, conservation of energy, linear momentum, and angular momentum, systems of particles, rotation and Newton's law of gravitation with Kepler's law of planetary motions.

4. Contents and Progress Schedule

Schedule of the course:

0. Orientation to WileyPlus + ORION system and the course survey
1. Ch3: Vectors (General introduction to physics: scalar vs vector, addition, dot and cross product, unit vector, and vector and calculus)
2. Ch4: Motion in Two and Three Dimensions (Projectile motion under uniform gravity, uniform circular motion, and relative motion)
3. Ch5: Force and Motion I (Newton's law of motion, its applicability, Galilean relativity, inertial frame, force and rate of change of linear momentum, and conservation of momentum)
4. Ch6: Force and Motion II (free body diagram, frictional force, drag force (viscous and inertial), and centripetal force)
5. Ch7: Kinetic Energy (transformation and transfer of energy, work, work done by gravity, work done by spring, and power)
6. Ch8: Potential Energy (isolated system, conservation of energy, conservative force and potential energy)
7. Ch9: Center of Mass (a system of particles, center of mass, conservation of total momentum of a system, and reduced mass of two body system)
- Midterm (Lecture 2-6)
8. Ch9: Collision (impulse, elastic and inelastic collision, and rocket

equation)

9. Ch10: Rotation (correspondance between linear and angular motion, moment of inertia, parallel and orthogonal axis theorem, center of mass and gravity)

10. Ch11: Rolling, Torque, and Angular Momentum (rigid body, torque as a rate of change of angular momentum, torque in the center of mass frame, rolling on an inclined plane)

11. Ch11 (rolling on a flat surface, physics of tops, precession, and gyroscopic effect)

12. Ch13: Gravitation (central force, effective potential, constant of motion, Kepler's law of planetary motion)

13. Ch13: Gravitation (gravity near the earth surface, gravitational potential) and Course survey

Final examination (Lecture 7-13)

5. Evaluation Method

Evaluation will be based on a midterm exam (30%), final exam (30%), homework assignments (20%), reading assignment and self-practice with ORION system (20%).

6. Textbook and References

Fundamentals of Physics Extended, 10th Edition David Halliday, Robert Resnick, Jearl Walker Wiley 2013 textbook

7. URL

<https://www.wileyplus.com/>

8. Preparation and Review

This course requires purchase of the WileyPlus system which costs \$40 USD. The system includes an electronic version of the required textbook with many integrated features to facilitate understanding of the subjects and problem solving skill in physics. The system also comes with a self-diagnostic tool, ORION, with which one will practice problem solving based on his/her own proficiency in each chapter that will be covered in the course. Access to internet is necessary outside of the class. Registration to the WileyPlus and payment method will be announced in the orientation in the first lecture.

9. In Addition

For those planning to take Physics B or/and C, the WileyPlus account that is purchased in this course will be reserved, and no additional payment is necessary. Survey of conceptual understanding of the subject will be conducted at the first and last lecture to assess the effectiveness of the instructional method.

<5> Life and Nature

Object: FGL. Language: E

Course Code: CB14252. Fall, Mon/4th (2 credit) .

Instructor: ROBERT, Martin (Institute for Excellence in Higher Education)

1. Class Subject

Big History: The organization and evolution of the universe (from the Big Bang to now)

2. Object and Summary of Class

This course aims to provide an overview of the natural processes that occurred over 13.7 billion years and led to the world that surrounds us. An important ambition is to help students in various fields appreciate the importance, interdependence and connections between physical, chemical, biological, and social sciences. The course will provide a broad perspective about the fantastic growth in complexity in the universe throughout its 13.7 billion year history. Students will explore the origin of our universe, of stars and of our solar system and home planet. This will be followed by an overview of ideas about the origin of life on earth and a survey of the intricate connectivity between living organisms and our planet, leading to massive evolution and eventually to human development. This will motivate them to think about the larger issues and challenges in science and technology. The course will also highlight our current knowledge based on scientific evidence, investigations, introduce how scientific ideas evolve, and address some of the remaining big and unsolved questions. We will also explore how specific events lead to the appearance of humans and the enormous impact of social and technological developments for our species and its consequences for our planet.

3. Goal of Study

In this course, the student will gain broad perspective about natural and living systems, their basic constituents and properties. The student will also better understand how natural and living systems consist of complex networks of elements whose intricate and dynamical balance is critical for our planet and all its inhabitants, as the ultimate global ecosystem.

- Some of the specific learning objectives include:
- Explain how thresholds of increasing complexity, differing scales of time and space, claim testing, and collective learning help us understand current and future events as part of a larger narrative.
 - Use multiple scientific perspectives to understand the history and evolution of the Universe and universal change.
 - Deepen an understanding of key scientific concepts and facts, and the use of these in constructing explanations.
 - Locate and understand how our own place, our community's place, and humanity as a whole both fit into and impact the Big History narrative, using the concept of "thresholds" to frame the past, present, and future.
 - Engage in scientific analysis using the theories and practices from multiple disciplines, toward an integrated, interdisciplinary understanding of the history of the Universe

To achieve this, the course will include lectures, interactive video presentations, as well as group activities and discussions on selected topics about the origin of matter and structure and the elements in the universe, our solar system, the origin of life, ecology, biodiversity, and evolution and human development driven by collective learning. Much of the teaching material is derived from the Big History Project which has been adapted for first year undergraduate curriculum while considering the limitations of a single semester course.

4. Contents and Progress Schedule

- 1) Introduction: What is Big History?
- 2) Getting started: The Big Bang
- 3) Stars light up. New chemical elements
- 4) Our solar system and earth
- 5) Life (1): What is Life?
- 6) Life (2): The origin of life. Common ancestry and diversity
- 7) Life (3): The Biosphere, energy, and biogeochemical cycles
- 8) Life (4): Biodiversity and ecosystems
- 9) Life (5): Evolution and natural selection
- 10) Early humans and collective learning
- 11) Agriculture and civilization
- 12) Expansion and interconnection
- 13) Acceleration 14) The Future 15) Final examination

5. Evaluation Method

Evaluation will be based on weekly attendance and active participation (10%), homework assignments (30), weekly in-class quizzes, exercises (20%), a team project (15%) as well as a final examination (25%).

6. Textbook and References

Big History Project web site

7. URL

<https://school.bighistoryproject.com/bhplive>

8. Preparation and Review

Students will be expected to spend about 1-2 hours per week, on average, reviewing video and written documents and doing assignments.

9. In Addition

- 1) This is a general, entry-level course that is open to all students, regardless of their study program and background. It is a required course for all first-year FGL program students. Japanese students and exchange students from any field of study are encouraged to enroll, knowing that this is an introductory course that is held in English. There will be many opportunities to listen, read, write and discuss in English in small groups.
- 2) Instructor available for questions and consultation upon appointment and during office hours, Thursdays 10:00-12:00 (mrobert@tohoku.ac.jp).

<6> Biology A

Object: FGL. Language: E

Course Code: CB22260. Fall, Tue/2nd (2 credit) .

Instructor: ROBERT, Martin (Institute for Excellence in Higher Education)

1. Class Subject

Essential Cell Biology

2. Object and Summary of Class

The cell is the fundamental unit of life. Its understanding is essential for any aspiring student or researcher in the natural sciences. The objective of this course is to learn the fundamental principles of cell biology by studying the cell's structure, organization, and the basic biochemical mechanisms and functions linked to the maintenance, replication and expression of its genetic information. This course emphasizes the genetic information storage, utilization processes at work in the cell, among many other important cellular functions, while Biology B emphasizes protein/enzyme and metabolic functions of the cell.

3. Goal of Study

After this course, the student will have a solid grasp of basic cellular and information processing functions including its components, DNA structure, replication and repair, gene expression, cellular communication. To do this, the main components, structures and information processing systems of the cell will be introduced and explored. In addition, the important connectivity among all cellular components and functions and a view of the cell as a non-reducible system will be emphasized.

Some of the specific learning objectives include:

- Understand the cell's fundamental role in all living systems
- Realize the importance of studying the cell in order to understand living organisms, ecosystems, as well as health and disease.
- Explain the fundamental differences between prokaryotic and eukaryotic cells from both a structural and evolutionary perspective
- Understand the function of the main cellular and genetic components and how they are connected to the living process so as to be able to extend and apply this knowledge in a new context
- Describe the basic components and mechanisms involved in DNA replication and repair, gene expression (transcription and translation) and their regulation
- Explain the basic mechanisms of gene and genome evolution
- Understand how these processes are connected with each other in an integrated manner
- Understand principles of cell signaling and information processing

To achieve this, students will complete weekly reading and problem set assignments, quizzes and in-class individual or group exercises, and an online forum will be used to promote co-learning and interactions between students. In addition to those activities, a weekly mini-presentation and final examination will be used to evaluate student learning and ability to extend what they learned in

novel contexts.

4. Contents and Progress Schedule

- 1) The fundamental unit of life (cell theory and the cell as a complex system)
- 2) Basic cell structure and architecture (prokaryotic and eukaryotic) 1
- 3) Basic cell structure and architecture (prokaryotic and eukaryotic) 2
- 4) Review of the basic chemical composition of cells
- 5) DNA and chromosomes (structure and function, chromatin remodeling)
- 6) DNA replication, repair, and recombination
- 7) From DNA to RNA (transcription and RNA processing)
- 8) From RNA to proteins (the genetic code, translation and protein synthesis)
- 9) Control of gene expression (transcriptional mechanisms)
- 10) Control of gene expression (post-transcriptional and epigenetic mechanisms)
- 11) Gene and genome evolution
- 12) Examining and analyzing the human genome
- 13) Cell signaling 1 (principles and concepts)
- 14) Cell signaling 2 (membrane receptors and signaling mechanisms)
- 15) Final examination

5. Evaluation Method

Attendance and active participation (10%), homework assignments (30), weekly in-class quizzes, exercises and mini-presentation (30%), examination(s) (30%).

6. Textbook and References

Essential Cell Biology Alberts B, Bray D, Lewis J, Raff M, Walter P, Hopkin K, Johnson A, Roberts K, Garland Science 2014

7. URL

8. Preparation and Review

Students are expected to spend 1-2 hours per week, on average, reading relevant textbook material to prepare for the class and completing online assignments.

9. In Addition

- 1) This is a general, entry-level course that is open to all students and is compulsory for first-year FGL students in the AMB program. Although not essential, it is best taken together with Biology B (Essential Biochemistry) to provide a more exhaustive view of cellular components and their functions. High school-level familiarity with basic organic chemistry and biology is assumed. Japanese students and exchange students from any field of study are encouraged to enroll, knowing that this is an introductory course which is held in English.
- 2) Alberts' Essential Cell Biology (4th Edition) is the main reference textbook.
- 3) Instructor available for questions and consultation upon appointment and during office hours, Thursdays 10:00-12:00 e-mail (mrober@tohoku.ac.jp).

<7> Chemistry A

Object: FGL. Language: E

Course Code: CB32250. Fall, Wed/2nd (2 credit) .

Instructor: ZHANPEISOV, Nurbosyn (Institute for Excellence in Higher Education)

1. Class Subject

Fundamentals of chemical bond theory

2. Object and Summary of Class

The nature of chemical bond is the fundamental concept to understand the structure and properties of atoms and molecules as well as any molecular substances. One will learn the electronic structure of atoms depending on its position in periodic table of elements, formation of bonds as well as different molecular associations based on quantum chemistry concepts.

3. Goal of Study

One must understand the structure of the atom based on its electronic configuration as well as its relationship with chemical and physical properties of any element. One will learn the concept of wave equation, its application to diatomic molecules and chemical bonds in large molecular associations. Shape or structure of simple polyatomic molecule can be explained via concept on hybridization or hybrid molecular orbital formations as well as relationships between bond length and electronic configuration. One must understand the nature of bonding responsible for stability of molecular associations.

4. Contents and Progress Schedule

1. Introduction
2. Classical mechanics and atomic model
3. Wave equation and basics of quantum chemistry
4. Electronic configuration and periodic table of elements
5. Covalent bond and ionic bond
6. Electronic structure of positively charged molecular hydrogen and diatomics
7. Hybrid molecular orbital and the shape of the polyatomic molecule
8. Mid-term test
9. Molecular complexes and intermolecular forces
10. Crystal structure motif and crystal field theory
11. Approximation methods, Valence-bond (VB) method
12. Hückel theory for ethylene, allyl
13. Hückel theory for butadiene and trimethylenemethane
14. Modern quantum chemistry
15. Term-end test

5. Evaluation Method

Evaluation will be based on class attendance, reports and on the results of

6. Textbook and References

Physical Chemistry Ira N. Levine 2008
Physical Chemistry: A Molecular Approach D.A. McQuarrie and J.D. Simon 2011

7. URL

8. Preparation and Review

We will have small quizzes, mid-term and term-end tests. The lecture attendance will be strictly controlled.

9. In Addition

<8> Mineralogy, Petrology & Geochemistry

Object: FGL. Language: E

Course Code: CB12256. Fall, Mon/2nd (2 credit) .

Instructor: ZHANPEISOV, Nurbosyn (Institute for Excellence in Higher Education)

1. Class Subject

Fundamentals of crystal structures of solids

2. Object and Summary of Class

The chemical crystallography applied to different kinds of solid structures is an important fundamental concept in many fields of chemistry and physics. One will learn the diversity of oxide, salt, metallic as well as organic solids, the nature and types of ordered structures composed of identical repeating units of a group or large atoms, molecules, ions as well as basic principles of defining crystal structures by physical and theoretical methods.

3. Goal of Study

One must understand different types of solids with crystalline and/or amorphous structures, a number of possible chemical bonding (driving force) in solids as well as fundamental energy units to characterize crystalline association. Also one must understand the structure-property relationship to describe tiny chemical and physical properties of any solid.

4. Contents and Progress Schedule

1. Introduction to the chemistry and physics of solids, mineralogy
2. Amorphous solid, glass and polymer (biopolymer)
3. Chemical bonding in solids, coordination number
4. Cohesive energies in solids, formation energy of a unit
5. Interatomic distances in crystal structures
6. Basic structure motifs of crystalline solids
7. Anisotropy and the Avogadro constant
8. Examples of crystal structures
9. Magnesium oxide, low coordination ions
10. Silica and zeolites
11. Titanium dioxides (rutile, anatase, brookite)
12. Covalent crystals of carbon
13. Metals
14. Metal-organic frameworks
15. Term-end test

5. Evaluation Method

Evaluation will be based on class attendance, reports and on the results of term-end test.

6. Textbook and References

Physical Chemistry R.J. Silbey, R.A. Alberty 2000

<9> World of Fine Arts

Object: FGL. Language: E

Course Code: CB42215. Fall, Thu/2nd (2 credit) .

Instructor: Mitsuru HAGA (Institute for Excellence in Higher Education)

1. Class Subject

Japanese Art History

2. Object and Summary of Class

Art shows (and encompasses) the way we comprehend and understand this Universe. Therefore Art should be regarded as a visual philosophy; not as a mere illustration of history based on written documents. Thereupon, the importance of learning its history, in this case, Japanese Art History, can never be exaggerated.

3. Goal of Study

The objective of this course is to provide an outline and basic knowledge about Japanese Art History ranging from the beginnings of human habitation in the Japanese archipelago to the present, including the art of the Jomon, Yayoi, Kofun, Asuka and Nara, Heian, Kamakura, Muromachi, Azuchi-Momoyama, Edo, Meiji, Taisho, Showa and Heisei Periods.

4. Contents and Progress Schedule

1. Course Orientation. What is Art ?
2. Art of Jomon Period
3. Art of Yayoi and Kofun Periods
4. Asuka Hakuou Art- the Reception of Buddhism
5. Art of Nara Period
6. Art of Heian Period 1
7. Art of Heian Period 2
8. Art of Kamakura Period
9. Art of Nanbokucho/Muromachi Period
10. Art of Momoyama Period
11. Art of Edo Period 1
12. Art of Edo Period 2
13. Art of Meiji Period
14. Art of Taisho, Showa and Heisei Periods (1)
15. Art of Taisho, Showa and Heisei Periods (2)

5. Evaluation Method

Evaluation will be based on final report (70%), performance in the class room (30%).

6. Textbook and References

A History of Japanese Art Noritake TSUDA Tuttle Publishing 2009

7. URL

8. Preparation and Review

The session time is limited and therefore self-directed learning is important. Students are required to prepare and review for each class.

9. In Addition

<10> Chemistry B

Object: FGL. Language: E

Course Code: CB43246. Fall, Thu/3rd (2 credit) .

Instructor: ZHANPEISOV, Nurbosyn (Institute for Excellence in Higher Education)

1. Class Subject

Fundamentals of physical chemistry

2. Object and Summary of Class

In this course, main emphasize will be given to the fundamentals and concepts that provide a basis for understanding physical chemistry, underline physical principles that govern the properties and behavior of chemical systems. It would be also as a learning basic course by giving a series of lectures on different topics of physical chemistry.

3. Goal of Study

One must understand the fundamental relationships between the structure of a chemical compound and its physical (as well as chemical) properties. One must understand main concepts of state equations, main laws of thermodynamics, reaction equilibrium as well as reaction kinetics.

4. Contents and Progress Schedule

1. Quantitative concepts of temperature, work, internal energy and heat
2. Classical mechanics and Newton's second law of motion
3. First law of thermodynamics
4. Barometric formula, van der Waals equation, enthalpy and heat capacity
5. Carnot heat engine, the second law of thermodynamics
6. Entropy, the third law of thermodynamics, thermodynamic equations of state
7. Kinetic theory of gases, model of a perfect gas
8. Types of average speeds, collision with a surface
9. Mid-term test
10. Reaction kinetics and reaction rate equation
11. First, second and third order reactions
12. Reversible first order reaction, parallel first order reaction
13. Consecutive first order reaction, mechanisms of chemical reactions
14. Radical reactions, unbranched and branched chain reactions
15. Term-end test

5. Evaluation Method

Evaluation will be based on class attendance, on the results of short quizzes, mid-term and term-end tests.

6. Textbook and References

Physical Chemistry Ira N. Levine 2008
Atkins Physical Chemistry P. Atkins, J. de Paula, J. Keeler 2014

7. URL

8. Preparation and Review

We will have small quizzes, mid-term and term-end tests. The lecture attendance will be strictly controlled.

9. In Addition

<11> Foundations of Calculus

Object: FGL. Language: E

Course Code: CB53215. Fall, Fri/3rd (2 credit) .

Instructor: Xavier DAHAN (Institute for Excellence in Higher Education)

1. Class Subject

Fundamentals of physical chemistry

2. Object and Summary of Class

In this course, main emphasize will be given to the fundamentals and concepts that provide a basis for understanding physical chemistry, underline physical principles that govern the properties and behavior of chemical systems. It would be also as a learning basic course by giving a series of lectures on different topics of physical chemistry.

3. Goal of Study

One must understand the fundamental relationships between the structure of a chemical compound and its physical (as well as chemical) properties. One must understand main concepts of state equations, main laws of thermodynamics, reaction equilibrium as well as reaction kinetics.

4. Contents and Progress Schedule

1. Quantitative concepts of temperature, work, internal energy and heat
2. Classical mechanics and Newton's second law of motion
3. First law of thermodynamics
4. Barometric formula, van der Waals equation, enthalpy and heat capacity
5. Carnot heat engine, the second law of thermodynamics
6. Entropy, the third law of thermodynamics, thermodynamic equations of state
7. Kinetic theory of gases, model of a perfect gas
8. Types of average speeds, collision with a surface
9. Mid-term test
10. Reaction kinetics and reaction rate equation
11. First, second and third order reactions
12. Reversible first order reaction, parallel first order reaction
13. Consecutive first order reaction, mechanisms of chemical reactions
14. Radical reactions, unbranched and branched chain reactions
15. Term-end test

5. Evaluation Method

Evaluation will be based on class attendance, on the results of short quizzes, mid-term and term-end tests.

6. Textbook and References

Physical Chemistry Ira N. Levine 2008
Atkins Physical Chemistry P. Atkins, J. de Paula, J. Keeler 2014

7. URL

8. Preparation and Review

We will have small quizzes, mid-term and term-end tests. The lecture attendance will be strictly controlled.

9. In Addition

<12> Calculus A

Object: FGL. Language: E

Course Code: CB52230. Fall, Fri/2nd (2 credit) .

Instructor: Xavier DAHAN (Institute for Excellence in Higher Education)

1. Class Subject

Foundations of Calculus

2. Object and Summary of Class

This class is a gentle introduction to the fundamental concepts of calculus (differentiation and integration) and focus mostly on practical skills with examples, in order to apply these tools on real problems.

3. Goal of Study

The student will learn the basic notions of limits of a function, of the derivative an integral of a function. And to some extent how to apply these tools to practical problems.

4. Contents and Progress Schedule

The class will follow the tentative schedule below:
The beginning of the class is usually dedicated to problem solving, the remaining time being classical lectures.

1. Intervals of the real lines. Functions.
2. Elementary functions. Polynomials, Fraction, n-th root.
3. Operation on functions. Limit of functions.
4. Derivative of a function.
5. Differentiation of functions.
6. Second-order derivative. Convex, concave functions.
7. Applications to find minimal and maximal values of functions.
8. Mid-term exam
9. Logarithm and exponential functions. Their derivatives.
10. Integral and areas. Definitions and concepts.
11. Computation of integrals
12. Computation of integrals, areas, volume.
13. Application of integrals.
14. Summary and review.
15. Final exam.

5. Evaluation Method

Based on the scores of final and mid-term exams as well as participation in class (homework submission).

6. Textbook and References

7. URL

8. Preparation and Review

Homework will be given on a regular basis to check the understanding of the materials taught.

9. In Addition

<13> Economics

Object: FGL. Language: E

Course Code: CB21208. Fall, Tue/1st (2 credit) .

Instructor: Dan QIN (Graduate School of Economics and Management)

1. Class Subject

Japanese Business and Economy A

2. Object and Summary of Class

This course studies the behavioral foundations of Japanese business and economics. The objective of this course is twofold. In the first place, students will learn basic microeconomic methods in modelling individual behavior. In the second place, we will introduce and discuss several examples of non-standard behavior that are common among Japanese people. We will then discuss the modeling of such types of behavior. Students are then required to compare behavior pattern studied in the class with typical patterns in their own culture.

3. Goal of Study

Upon the completion of this course, students will come to understand the difference between real life decision making (in the case of Japanese people) and the behavioral patterns assumed by classical economic theory. Students are also expected to be able to build simple models explaining nonstandard behavior from their own culture.

4. Contents and Progress Schedule

We will first introduce the economic sense of "rationality" and then discuss several typical behavior deviating from this hypothesis. At the second half of this class, students will give presentations about typical nonstandard behaviors in their own culture.

- 1) Orientation and introduction
- 2) Rational decision maker in the economic sense: Preference maximization hypothesis
- 3) Properties of preference and utility
- 4) Uncertainty and risk
- 5) Strategic behavior: Non-cooperative game
- 6) Aimai: Ambiguity in Japanese communication
- 7) Kritisuteki: Following rules
- 8) Shundan Ishiki: Japanese group consciousness
- 9) Student Presentation
- 10) Student Presentation
- 11) Student Presentation
- 12) Student Presentation
- 13) Student Presentation
- 14) Student Presentation
- 15) Student Presentation

Weeks 9 to 15 are reserved for student to make presentations about examples of nonstandard behavior in their own culture.

5. Evaluation Method

Students will be evaluated by class participation (40%) and presentation (60%).

6. Textbook and References

The Japanese Mind: Understanding Contemporary Japanese Culture
Davis R. J., Ikeno O. Tuttle 2002 Reference
Advanced Microeconomic Theory Jehle G. A., Reny P. J. Prentice Hall 2011 Reference

7. URL

8. Textbook and Review

Students are required to prepare presentations reflecting the typical behavior of their own culture.

9. In Addition

<15> Linear Algebra A

Object: FGL. Language: E

Course Code: CB23250. Fall, Tue/3rd (2 credit) .

Instructor: Marcin SCHROEDER (Institute for Excellence in Higher Education)

1. Class Subject

Introductory Linear Algebra

2. Object and Summary of Class

This is a course introducing students into the mathematical discipline of linear algebra understood as a theory of algebraic structures (vector spaces over real or complex numbers) and functions between them which preserve their structures (linear mappings). The introduction follows the principles of rigorous development of mathematical theories which starts from the definitions of concepts and axioms and proceeds to determination of true consequences of the axioms. From this point of view, the course presents to students mathematical methodology. The subject of the course is of a special importance in mathematics. Linear algebra was originally the paradigm for discrete mathematics as an alternative to the other fundamental theory of differential and integral calculus. They were complementary aspects of mathematical thinking and both are reflected in entire modern mathematics and mathematical sciences. In particular, concepts and methods presented in this course are necessary for understanding theoretical physics.

3. Goal of Study

Upon successful completion of the course students will be able to proficiently use the conceptual framework of linear algebra in its multiple roles within mathematics, physics, and other mathematical sciences. The course has a relatively extensive load of algebraic theory at the increased level of abstraction. This will prepare students for the use of relevant mathematical literature in their studies and for the creative and innovative use of mathematical methods which can be derived from the theory. Students equipped with the educational experience gained in this course will be redy for their own, independent study of mathematical works addressing problems of their future professional interests.

4. Contents and Progress Schedule

- Week 1: Preliminaries (Review of prerequisite concepts and methods necessary for the course)
- Week 2: Vector Spaces over Field K
- Week 3: Matrices
- Week 4: Linear Mappings
- Week 5: Linear Maps and Matrices
- Week 6: Scalar Products and Orthogonality
- Week 7: Determinants

- Week 8: Applications of Determinants
- Week 9: Midterm Examination
- Week 10: Symmetric, Hermitian, and Unitary Operators
- Week 11: Eigenvectors and Eigenvalues I
- Week 12: Eigenvectors and Eigenvalues II
- Week 13: Convex Sets
- Week 14: Review
- Week 15: Comprehensive Final Examination

5. Evaluation Method

25% of course grade based on credit for homework assignments
25% of course grade based on the result of Midterm Exam
50% of course grade based on the result of Final Examination

6. Textbook and References

Linear Algebra, 3rd ed. Serge Lang Springer 1987

7. URL

TBA

8. Preparation and Review

The course does not require any particular prerequisite knowledge beyond a good high school mathematical background and a high level of maturity in continuing study. Students have to read the relevant chapter from the textbook corresponding to the recent lecture. Also, they will get frequent homework assignments of problems to be solved and submitted at the next class.

9. In Addition

<14> Foundations of Linear Algebra

Object: FGL. Language: E

Course Code: CB13226. Fall, Mon/3rd (2 credit) .

Instructor: Marcin SCHROEDER (Institute for Excellence in Higher Education)

1. Class Subject

Elementary Linear Algebra

2. Object and Summary of Class

This is a course bridging high school and college level mathematics introducing students in concepts, methods, and applications of linear algebra at its lowest level of abstraction limited to vector spaces over the field of real numbers. The course follows the cycle of its historical course of development from the application to analytic geometry and solving systems of linear equations in many variables, through the concepts of vectors, matrices and of the structures of vector spaces and linear mappings formalizing the subject, to more abstract concepts of scalar products, orthogonality, determinants, eigenvectors and eigenvalues. The cycle closes through examples of multiple applications of this increased abstraction to mathematical formulation of problems in diverse contexts and their solutions.

3. Goal of Study

The main objective of the course is to familiarize students with methods of linear algebra without going to a very high level of abstraction. Upon successful completion of the course students should be able to formulate relevant problems in terms of linear algebra and to use standard methods for solving them. Linear algebra belongs to the disciplines of mathematics of greatest accumulated experience and its methods can be found in both virtually all mathematical theories and in diverse applications of mathematics. Thus, the methods of linear algebra are indispensable tools for everyone who wants to use mathematics professionally. This course is intended as a development of students' toolboxes for their further study. Another objective of the course is to prepare students for their own future study of mathematics. The content of the course is limited to most typical methods of linear algebra. The effective use of mathematics requires the ability of autonomous learning and the course will prepare students for this task.

4. Contents and Progress Schedule

- Week 1: Preliminaries (Review of prerequisite concepts and methods necessary for the course)
- Week 2: Vectors (vectors in geometry of two and three dimensions, scalar and vector products in geometry, description of lines and planes)
- Week 3: Matrices and Linear Equations I (operations on matrices, linear combinations, matrices of systems of equations)
- Week 4: Matrices and Linear Equations II (solving systems of linear equations through the matrix manipulation -elimination)

- Week 5: Vector Spaces
- Week 6: Linear Mappings
- Week 7: Composition and Inverse Mappings
- Week 8: Scalar Products and Orthogonality
- Week 9: Midterm Examination
- Week 10: Determinants
- Week 11: Eigenvectors and Eigenvalues
- Week 12: Linear Algebra with Complex Numbers
- Week 13: Applications
- Week 14: Applications
- Week 15: Comprehensive Final Examination

5. Evaluation Method

25% of course grade based on credit for homework assignments
25% of course grade based on the result of Midterm Exam
50% of course grade based on the result of Final Examination

6. Textbook and References

Introduction to Linear Algebra 2nd or later ed. Serge Lang Springer 1997
Elementary Linear Algebra 10th ed. Howard Anton & Chris Rorres Wiley 2010

7. URL

8. Preparation and Review

Students do not need any preparation beyond good high school background in mathematics in particular in topics such as arithmetics of real numbers, systems of linear equations in multiple variables, operations on sets, concept of a function of one and of many variables, operations on functions, basics of mathematical logic. Students will be frequently asked to solve a few problems as a homework assignment. The assignments must be submitted at the next class meeting.

9. In Addition

Students should secure access to any edition of the textbook by Serge Lang (older editions are available on the internet without charge). The textbook by Howard Anton is listed here only as a reference for students who want to expand their knowledge beyond the content of the course. Also, Anton's textbook provides multiple applications of the methods studied in the course and presents material with very detailed explanations. However, only material from Lang's textbook will be required on tests. Any material required in the course, but not covered by Lang will be included in the notes distributed by the instructor.

<16> Basic Japanese 1

Object: FGL. Language: E

Course Code: CB45201. Fall, Mon/5th, Tue/5th, Thu/5th, Fri/5th (4 credit) .

Instructor: Natue SUGAYA, Kei YOSHIMOTO (Institute for Excellence in Higher Education), Atsuko UCHIYAMA

1. Class Subject

Japanese for beginners

2. Object and Summary of Class

Intended for students who will study Japanese for the first time. This class aims to help students acquire basic knowledge of Japanese language and enhance the four skills of speaking, listening, reading, and writing.

3. Goal of Study

Students will
- master elementary Japanese grammar, vocabulary, kana (hiragana, katakana) and approximately 150 basic kanji
- acquire minimum skills in speaking, listening, reading and writing for essential everyday situations
- achieve a proficiency level equivalent to JLPT N5.

4. Contents and Progress Schedule

1. Course orientation, Kana quiz
- 2-5. Lesson 1 X wa Y desu construction, Question sentences
- 6-9. Lesson 2 Demonstrative (ko/so/a)
- 10-13. Lesson 3 Verb types and the present tense
- 14-18. Lesson 4 Describing where things are, Past tense of verbs
- 19-23. Lesson 5 Adjectives, Counting
- 24-28. Lesson 6 Te-form, Describing two activities
29. Midterm exam (Katakana, Kanji, Grammar, Listening)
30. Midterm exam (Speaking)
- 31-34. Lesson 7 Various meanings of te iru form
- 35-39. Lesson 8 Short forms (plain forms)
- 40-44. Lesson 9 Past tense short forms
- 45-49. Lesson 10 Comparison between two items
- 50-54. Lesson 11 Describing hope or aspiration (-tai)
- 55-58. Lesson 12 Explaining things (-n desu)
- 59-60 Summary

5. Evaluation Method

1. Exams(Midterm exam: Katakana, Kanji, Grammar, Listening, Speaking; Final exam: Katakana, Kanji, Grammar, Listening, Writing, Speaking) 60%,
2. Quizzes (Kana, Kanji, vocabulary, grammar) 20%,
3. Homework 10%

4. Class participation 10%

6. Textbook and References

Genki 1, second edition Banno et al. The Japan Times 2011
Textbook
Genki 1 Workbook, second edition Banno et al. The Japan Times 2011 Textbook

7. URL

Genki-Online http://genki.japantimes.co.jp/index_en

8. Preparation and Review

(1) Those who have no knowledge of the Japanese characters (hiragana, katakana) should learn hiragana and katakana as a prerequisite to joining the program by using prescribed materials.
(2) During the course we expect you to:
1. Submit all homework assignments by due dates. Late work will be marked lower.
2. Prepare for the lessons: Listen CD and learn vocabulary in advance. Read the grammar explanations in advance.

9. In Addition

<17> Health

Object: FGL. Language: E

Course Code: CB44215. Fall, Thu/4th (2 credit) .

Instructor: Ryoichi NAGATOMI (Graduate School of Biomedical Engineering)

1. Class Subject

Health Science

2. Object and Summary of Class

Threats to health has long been determined by how well you are fed, and how well you could stay away from contagious bacteria and viruses. Yet, in the world where we know how successful aging would be accomplished, threats to health depend rather on your every day behavior, your life style. Moreover, thanks to the developed way of transportation of today's world, many people should confront with viruses we've never encountered. In this class we will discuss about the latest health care tips and topics with scientific background. We will make full use of multinational class, comparing the health care system in different countries and health tips with different cultural background.

3. Goal of Study

The aim of the class is to encourage students to understand and interpret flooding amount of health care information based on scientific way of thinking.

4. Contents and Progress Schedule

The topics will vary and may be picked up upon discussion in the class. The topics covered in the previous classes were:-

1. Welcome to the G30 Health Science class: a guide to the class.
2. How health care systems work 1.
3. How health care systems work 2.
4. What are risk factors?
5. Obesity.
6. Exercise, physical activity and health.
7. Food and health.
8. Aging.
9. Memory and cognition.
10. Genes and health.
11. Common cold and flu.
12. Physical training; how it works.
13. Sports injury 1.
14. Sports injury 2.
15. Drug abuse and drug allergy.

5. Evaluation Method

Participation is essential. I appreciate an active involvement in the discussion. Instead of an overall exam, Evaluation will therefore be based

on participation and brief E-mail based reports about the discussion in the class with their own opinion on the topic after the classes.

6. Textbook and References

7. URL

8. Preparation and Review

I will occasionally organize group works, in which each group needs to search for information on a certain topic and report in the next class.

9. In Addition

<19> Sports A

Object: AMB. Language: J

Course Code: CB23253. Fall, Tue/3rd (1 credit) .

Instructor: Akira SATO (Graduate School of Medicine)

1. Class Subject

Kyudo (Japanese Archery – Rules of Shooting and Etiquette)

2. Object and Summary of Class

As many of the students will be studying Kyudo for the first time, they will learn the basics of handling the bow and arrows, and drawing and releasing the bow. Students will learn how the skills in Kyudo are based on a deep understanding of the mechanics of the human body and the characteristics of the equipment; in addition to learning how to hit a target, they will gain a rational and aesthetic understanding of the postures and movements.

3. Goal of Study

Because Kyudo techniques and etiquette are very closely related, students will learn shooting techniques and correct movements in formalized situations. Shooting techniques are comprised of a systematic set of rules for handling the bow, while etiquette is composed of modes of traditional behavior. The goal of the class is to enable students to gain a scientific understanding of the rational postures/movements, and to learn to adapt their experiences into daily life.

4. Contents and Progress Schedule

Although learning shooting skills is the first priority, etiquette will also be learned step by step in each class as it is fundamental to posture and movement. Students will experience the fun and difficulties of Kyudo through games and competitions.

1. Guidance: Hazard prevention and safety measures. Summary of technique and etiquette
2. Introduction: Basics of shooting, Basics of standing posture
3. Holding the bow and gripping the string / two kinds of sitting posture ("Kiza," "Seiza") / three-breath-bowing
4. Principles of positioning the limbs (lower and upper body) / two kinds of bowing in sitting position ("Shikkenrei," "Sesshurei") / two-breath-bowing
5. Adjusting the body posture / the "Three Crosses" / two more kinds of bowing in sitting position ("Takushurei", "Soshurei")
6. Setting the grip on the bow to control it correctly ("Tenouchi") / one more kind of bowing in sitting position ("Goshurei")
7. The leather archery glove ("Yugake") and its usage / walking in Kyudo
8. "The Five Crosses" and determining correct shooting form / the "Five Crosses" / "Suriashi" -walking
9. Drawing the bow / main points of "Uchiokoshi" and "Hikiwake" /

synchronization of breathing and movements

10. Obtaining full draw length / drawing until "Yazuka" / various types of body turn

11. Arms and trunk forming a cross ("Tateyokojumonji," "Hanare no Jumonji") / turning the body while walking

12. Tips for reliably hitting the target (the four requirements in "Tsumeai") / moving forward and backward while kneeling ("Shikko," "Shittai")

13. Important technical points about hitting or missing the target (vertical and horizontal "Nobia") / "Sonkyo"

14. The end of the shot (important aspects of "Zanshin") / synchronization of movements with breathing ("Ikiai")

15. Conclusion: Skill test - Hit 1m diameter target at a distance of 28m in the basic posture and movements

5. Evaluation Method

Students must attend class, as learning the body movements requires practice. Grades will be based on attendance rate and skill tests. Students will take a practical examination, shooting 79cm diameter target at a distance of 28m, according to the rules of formal technique and etiquette.

6. Textbook and References

7. URL

8. Preparation and Review

9. In Addition

<18> Sports A

Object: AMB. Language: J

Course Code: CB23252. Fall, Tue/3rd (1 credit) .

Instructor: Akira TAMAGAWA (Graduate School of Medicine)

1. Class Subject

Badminton

2. Object and Summary of Class

In this class, students will learn the importance of physical activity and how to exercise appropriately through badminton, a recreational sport with which many students are already familiar. Also, by playing competitively they will experience the importance of expressing intent and relating to and communicating with others. This will foster their initiative and cooperativeness. The class will be conducted so that anyone can take it, regardless of their level of physical fitness or badminton ability. By hitting the shuttlecock back and forth with various partners, I hope that students will learn not only the technical abilities needed to enjoy rallying, but also social skills. The class aims to teach students to enjoy sports activities, and feel confident about engaging in sports in their everyday lives. Badminton uses a shuttlecock. The word "shuttle" means "to come and go." The player hits the shuttlecock, which their partner then returns, so the player then must hit it back to the partner again. This is essentially a form of communication. Both beginners and experts are welcome in this class.

3. Goal of Study

Students will come to enjoy exercising through actively participating in physical activities.

All students will learn to enjoy rallying and matches without fear of making mistakes.

Students will acquire enough skill to participate in doubles matches.

In this class, "learning to play" and "technique" do not refer only to skill at hitting the shuttlecock with the racket. They also include playing badminton under various conditions while observing others, in addition to the ability for self-observation. They will learn about "intangibles" that cannot be taught in classroom lectures with the objective of obtaining "awareness" of the present moment.

4. Contents and Progress Schedule

- 1st Class, guidance
- 2nd What kind of sport is badminton?
- 3rd Making contact between shuttlecock and racket
- 4th Misc. strokes pt. 1
- 5th Misc. strokes pt. 2
- 6th Misc. strokes pt. 3

- 7th Misc. strokes pt. 4
- 8th Misc. strokes pt. 5
- 9th Misc. strokes pt. 6
- 10th Basic skills for enjoying doubles games pt. 1
- 11th Basic skills for enjoying doubles games pt. 2
- 12th Basic skills for enjoying doubles games pt. 3
- 13th Basic skills for enjoying doubles games pt. 4
- 14th Basic skills for enjoying doubles games pt. 5
- 15th Concluding remarks and Trainings

From the 2nd class on, content will be arranged based on assessment of the students' skill level. Also, 1 v. 1 (singles) and 2 v. 2 (doubles) practice will be conducted while learning stroke skills. Content of instruction may be changed depending on student proficiency. The pace of the class may also change depending on the speed at which the students progress.

5. Evaluation Method

Needless to say, this class largely assumes participation as it is based on learning skills and practicing. On the 15th class there will be a lecture. A test may be given as well. Basically, the class will be graded as Pass - A (excellent) or Fail - D (poor).

6. Textbook and References

7. URL

8. Preparation and Review

9. In Addition

<20> Sports A

Object: AMB. Language: J

Course Code: CB23254. Fall, Tue/3rd (1 credit) .

Instructor: Ryoichi NAGATOMI (Graduate School of Biomedical Engineering)

1. Class Subject

Soccer (associated football)

2. Object and Summary of Class

Soccer is the most popular sports in the world. Soccer has attracted many people because of its demand on fitness and skills, tactical thinking, and communication among the team members. Depending on one's experience in playing soccer, technical skill may largely differ, and one might feel inferior or alienated when they have less experience. Once you find out your role in the team, however, you will find a totally different world of soccer, in which you find confidence and effectiveness in the team. The sense of effectiveness and efficacy in the team will not be accomplished alone, but sharing ideas and roles among the team members is essential. The role plays in this soccer class will definitely give you a value! Why don't you enjoy playing soccer with us.

3. Goal of Study

- understanding basic skills of soccer
- different ways of kicking a ball
- accuracy
- speed and power
- trick plays
- different ways of stopping a ball
- accuracy
- transition
- trick plays
- understanding basic concept of team plays in soccer
- ways to communicate among the team members
- passing and receiving
- positioning
- supporting
- understanding basic roles in soccer
- attacking
- defending

4. Contents and Progress Schedule

D1. Guidance
In every class a 15-30-min skill up session for understanding basic skills in soccer will be provided. After the warm up and skill up sessions, league matches will be organized. A Man of the Match will be selected in each

class. In case of bad weather like raining, indoor activity related soccer will be organized.

- D2. Skill check
 - D3. Team assignment
 - D4. Ball control: kicking
 - D5. Ball control: stopping and passing
 - D6. Ball control: shooting
 - D7. The role of a goal keeper
 - D8. Team tactics: passing and receiving, creating pass chances by changing the position
 - D9. Team tactics: creating or depriving attacking spaces
 - D10. Team tactics: team dynamics in defending and attacking with 2-3 players
 - D11. Team tactics: team dynamics in defending and attacking with 4-5 players
 - D12. Advanced tactics: various style of supporting
 - D13. Advanced tactics: various style of defending
 - D14. Advanced tactics: quick transition from defending to attacking (counter-attack)
 - D15. Advanced tactics: taking advantages of the team members
- The order and the contents of classes may differ depending on the weather, the skills of the students and etc.

5. Evaluation Method

Participation is essential (80%). Understanding the role in a team of your own as well as that of the teammates is essential, and one's progress will be evaluated (20%).

6. Textbook and References

7. URL

8. Preparation and Review

9. In Addition

<21> Sports A

Object: AMB. Language: J

Course Code: CB23255. Fall, Tue/3rd (1 credit) .

Instructor: Toshihiko FUJIMOTO (Institute for Excellence in Higher Education)

1. Class Subject

Softball

B....., Fair (70-79%)
C....., Passing (60-69%)
D....., Failure (0-59%)

2. Object and Summary of Class

The aim of "Sports A: Softball class is constructed of two part. First part is "Team management" and Second part is Coaching". Goal of first part is to lean the team management that is how to relation with team member using softball game. Goal of second part is to lean the coaching that is how to make menu of practice and to teach for member.

3. Goal of Study

The aim of "Sports A: Softball class is constructed of two part. First part is "Team management" and Second part is Coaching". Goal of first part is to lean the team management that is how to relation with team member using softball game. Goal of second part is to lean the coaching that is how to make menu of practice and to teach for member.

4. Contents and Progress Schedule

First part. Team management. Number of classes:1-8.

1. Guidance.
 2. Decision of own objective and team formation.
 3. Softball practice and Communication with team mate.
 4. Softball practice and team production.
 5. Softball game and team condensation.
 6. Softball game and leadership.
 7. Softball game and norm within the team.
 8. Softball game, review and team management.
- Second part. Coaching. Number of classes: 9-15.
9. Softball game and coaching theory 1: Assessment.
 10. Softball game and coaching theory 2: Feedback.
 11. Softball game and coaching theory 3: Teaching of softball practice.
 12. Softball game and coaching theory 4: Study form.
 13. Softball game and coaching theory 5: Reflection.
 14. Softball game and coaching theory 6: Belief of teaching.
 15. Softball game and review.

5. Evaluation Method

Examination 50% and short review report on every class 50%.

Grades of the course will be assigned as follows:

AA.....,Excellent (90-100%)
A....., Good (80-89%)

6. Textbook and References

7. URL

8. Preparation and Review

9. In Addition

Place: Kawauchi field.

<22> Sports A

Object: AMC. Language: J

Course Code: CB53216. Fall, Fri/3rd (1 credit) .

Instructor: Haruki MOMMA (Graduate School of Medicine)

1. Class Subject

Tennis

9. In Addition

2. Object and Summary of Class

Tennis is a popular recreational sports at all ages. This class aims to acquire basic skills, rules, and manners of tennis, and, most importantly, to enjoy playing tennis regardless of one's skills.

3. Goal of Study

Students will understand and put in a practice of basic skills, rules, and manners of tennis.

4. Contents and Progress Schedule

1. Guidance
2. How to use racket and ball
3. Rally with a short distance
4. Strokes (forehand)
5. Strokes (backhand)
6. Servives
7. Serve return
8. Volley (forehand)
9. Volley (backhand)
10. Singles games (half court)
11. Singles games (full court)
12. Doubles games (confirmation of the rules)
13. Doubles games (full court)
14. Doubles games in league match
15. Doubles games in tournament

5. Evaluation Method

Evaluation is performed comprehensively based on the participation in class (70-80%), the degree of proficiency (10-20%), and a report (10%).

6. Textbook and References

7. URL

8. Preparation and Review

Upon joining the class, you need to have your own shoes appropriate for playing tennis and also need to wear sportswear when you play.

<23> Sports A

Object: AMC. Language: J

Course Code: CB53217. Fall, Fri/3rd (1 credit) .

Instructor: Akira SATO (Graduate School of Medicine)

1. Class Subject

Kyudo (Japanese Archery – Rules of Shooting and Etiquette)

2. Object and Summary of Class

As many of the students will be studying Kyudo for the first time, they will learn the basics of handling the bow and arrows, and drawing and releasing the bow. Students will learn how the skills in Kyudo are based on a deep understanding of the mechanics of the human body and the characteristics of the equipment; in addition to learning how to hit a target, they will gain a rational and aesthetic understanding of the postures and movements.

3. Goal of Study

Because Kyudo techniques and etiquette are very closely related, students will learn shooting techniques and correct movements in formalized situations. Shooting techniques are comprised of a systematic set of rules for handling the bow, while etiquette is composed of modes of traditional behavior. The goal of the class is to enable students to gain a scientific understanding of the rational postures/movements, and to learn to adapt their experiences into daily life.

4. Contents and Progress Schedule

Although learning shooting skills is the first priority, etiquette will also be learned step by step in each class as it is fundamental to posture and movement. Students will experience the fun and difficulties of Kyudo through games and competitions.

1. Guidance: Hazard prevention and safety measures. Summary of technique and etiquette
2. Introduction: Basics of shooting, Basics of standing posture
3. Holding the bow and gripping the string / two kinds of sitting posture ("Kiza," "Seiza") / three-breath-bowing
4. Principles of positioning the limbs (lower and upper body) / two kinds of bowing in sitting position ("Shikkenrei," "Sesshurei") / two-breath-bowing
5. Adjusting the body posture / the "Three Crosses" / two more kinds of bowing in sitting position ("Takushurei", "Soshurei")
6. Setting the grip on the bow to control it correctly ("Tenouchi") / one more kind of bowing in sitting position ("Goshurei")
7. The leather archery glove ("Yugake") and its usage / walking in Kyudo
8. "The Five Crosses" and determining correct shooting form / the "Five Crosses" / "Suriashi" -walking
9. Drawing the bow / main points of "Uchiokoshi" and "Hikiwake" /

synchronization of breathing and movements
10. Obtaining full draw length / drawing until "Yazuka" / various types of body turn

11. Arms and trunk forming a cross ("Tateyokojumonji," "Hanare no Jumonji") / turning the body while walking
12. Tips for reliably hitting the target (the four requirements in "Tsumeai") / moving forward and backward while kneeling ("Shikko," "Shittai")
13. Important technical points about hitting or missing the target (vertical and horizontal "Nobia") / "Sonkyo"
14. The end of the shot (important aspects of "Zanshin") / synchronization of movements with breathing ("Ikiai")
15. Conclusion: Skill test - Hit 1m diameter target at a distance of 28m in the basic posture and movements

5. Evaluation Method

Students must attend class, as learning the body movements requires practice. Grades will be based on attendance rate and skill tests. Students will take a practical examination, shooting 79cm diameter target at a distance of 28m, according to the rules of formal technique and etiquette.

6. Textbook and References

7. URL

8. Preparation and Review

9. In Addition

<24> Sports A

Object: AMC. Language: J

Course Code: CB53218. Fall, Fri/3rd (1 credit) .

Instructor: Toshihiko FUJIMOTO (Institute for Excellence in Higher Education)

1. Class Subject

Softball

A....., Good (80-89%)
B....., Fair (70-79%)
C....., Passing (60-69%)
D....., Failure (0-59%)

2. Object and Summary of Class

The aim of "Sports A: Softball class is constructed of two part. First part is "Team management" and Second part is Coaching". Goal of first part is to lean the team management that is how to relation with team member using softball game. Goal of second part is to lean the coaching that is how to make menu of practice and to teach for member.

3. Goal of Study

The aim of "Sports A: Softball class is constructed of two part. First part is "Team management" and Second part is Coaching". Goal of first part is to lean the team management that is how to relation with team member using softball game. Goal of second part is to lean the coaching that is how to make menu of practice and to teach for member.

4. Contents and Progress Schedule

First part. Team management. Number of classes:1-8.

1. Guidance.
2. Decision of own objective and team formation.
3. Softball practice and Communication with team mate.
4. Softball practice and team production.
5. Softball game and team condensation.
6. Softball game and leadership.
7. Softball game and norm within the team.
8. Softball game, review and team management.

- Second part. Coaching. Number of classes: 9-15.
9. Softball game and coaching theory 1: Assessment.
 10. Softball game and coaching theory 2: Feedback.
 11. Softball game and coaching theory 3: Teaching of softball practice.
 12. Softball game and coaching theory 4: Study form.
 13. Softball game and coaching theory 5: Reflection.
 14. Softball game and coaching theory 6: Belief of teaching.
 15. Softball game and review.

5. Evaluation Method

Examination 50% and short review report on every class 50%.

Grades of the course will be assigned as follows:

AA.....,Excellent (90-100%)