<1> Physics A

Class Schedule: Monday, 2nd. (2 credits) Category: Basics of Discipline-Basics of Physics

Course Code: CB12206 Instructors: Takeshi KOIKE

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, rotations, and Newton's law of gravitation with Kepler's law of planetary motions.

4. Contents and Progress Schedule

0. Orientation to WileyPlus + historical perspective of Newtonian mechanics
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 (coresspondence 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%), pre-lecture assignment(20%).

6. Textbook and References

Fundamentals of Physics Extended, 11th Edition David Halliday, Robert Resnick, Jearl Walker Wiley 2018 textbook
The Feynman Lectures on Physics, Volume I Feynman • Leighton • Sands Feynman • Leighton • Sands

7. URL

https://www.wileyplus.com/

8. Preparation and Review

A pre-lecture reading of the textbook followed by short adaptive quizzes will be assigned for each lecture. In addition, after each lecture, a set of selected problems from WileyPlus will be assigned.

9. Practical business

10. Students must bring their own computers to class

Yes.

Various demonstration/simulation with MATLAB will be performed.

11. In Addition

This course requires purchase of the WileyPlus system which costs $45 USD. The system includes an electronic version of the required textbook with many integrated features to facilitate understanding of the subjects and problem solving skills in physics. The system also comes with self-diagnostic adaptive quizzes, 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 the internet is necessary outside of the class. Registration to the WileyPlus and payment method will be announced in the orientation during the first lecture.

<2> Life and Nature

Class Schedule: Tuesday, 2nd. (2 credits) Category: Foundations-Life

Course Code: CB22234 Instructors: Satoshi KATAYAMA

1. Class Subject

Life and Nature: Biology of plant, animal, marine organism, microorganism, and their future researches

2. Object and Summary of Class

The aims of this class are to develop an understanding of biological facts and principles, to enhance an interest in and develop an appreciation of the nature and diversity of organisms, to create an awareness of the application of biological knowledge to modern society in personal, social, economic, environmental, industrial, agricultural, medical, waste management and other technological contexts, and to develop in students an ability to make informed evaluations about contemporary issues concerning life and nature.

3. Goal of Study

In this course, the student will have basic knowledge about plant science, animal science, marine biology, micro-organism science, and will gain a broad perspective about natural and living systems, their basic constituents and properties. These knowledge will be very useful when considering agricultural, scientific and engineering measures for global environmental problems and food problems..

4. Contents and Progress Schedule

Classes are conducted onsite and/or online.

1. Life and nature of plant 1 (Plants and climate) Prof. K. Homma
2. Life and nature of plant 2 (Functional properties of plants) Assoc. Prof. K. Kato
3. Life and nature of plant 3 (Plants and pathogens) Assist. Prof. D. A. Abebe
4. Life and nature of animal 1 (Evolution and phylogeny of animal) Prof. K. Sato
5. Life and nature of animal 2 (Reproduction and generation of animal) Prof. K. Sato
6. Life and nature of animal 3 (Ecology and physiology of animal) Prof. K. Sato
7. Life and nature of ocean 1 (Evolution and phylogeny of marine organisms) Prof. S. Katayama
8. Life and nature of ocean 2 (Marine ecology) Prof. S. Katayama
9. Life and nature of ocean 3 (Marine ecosystem) Prof. S. Katayama
10. Life and nature of microorganism 1 (Metabolism and Energy Generation Systems in Microbes) Prof. K. Abe
11. Life and nature of microorganism 2 (Structure analysis of bacterial toxins) Prof. Y. Tanaka
12. Life and nature of microorganism 3(Structural analysis of antibiotics on their bacterial targets) Assist. Prof. T. Yokoyama
13. Future researches of life and nature 1 (Food and agricultural immunology) Prof. M. Toda
14. Future researches of life and nature 2 (Future agricultural production and food industry) Prof. S. Ogura
15. Future researches of life and nature 3 (Life sciences using synchrotron light) Prof. M. Harata

Textbook and references will be notified at the class.

5. Evaluation Method

Evaluation will be based on weekly attendance (50%) and homework assignments & reports (50%)

6. Textbook and References

7. URL

8. Preparation and Review

Review related topics

9. Practical business

10. Students must bring their own computers to class No

11. In Addition

<3> Linear Algebra A

Class Schedule: Monday, 1st. (2 credits) Category: Basics of Discipline-Basics of Mathematics

Course Code: CB23231 Instructors: Rintaro OHNO

1. Class Subject

Basics of linear algebra

2. Object and Summary of Class

Linear algebra is an essential tool to handle multi-component quantities and it helps studies not only in mathematics but also natural and social sciences. This class aims to provide basic notions and understanding of linear algebra such as vectors and matrices.

3. Goal of Study

Fundamental understanding of methods dealing with vectors, matrices and determinants.

4. Contents and Progress Schedule

Class 1: Introduction and notations
Class 2: Vector space
Class 3: Linear independence and basis
Class 4: Matrices and their rank
Class 5: Gaussian elimination
Class 6: Addition, scalar and matrix multiplications
Class 7: Regular matrices
Class 8: Inverse of a matrix
Class 9: Determinants and their properties
Class 10: Calculation of determinants
Class 11: Cofactor expansion
Class 12: Systems of linear equations
Class 13: Cramer's Rule
Class 14: Linear mappings
Class 15: Summary and final exam

Depending on the understanding of attending students, the schedule and content of the lecture mentioned above may be modified.

5. Evaluation Method

Evaluation will be based on the results of tests and the final exam

6. Textbook and References

Linear Algebra 3rd ed. Serge Lang Springer 1987 Reference

7. URL

8. Preparation and Review

Students are required to review the content of the lectures, prepare questions if necessary and show the level of their understanding during class.

9. Practical business

10. Students must bring their own computers to class

A PC is not required, but will be useful for the lectures.

11. In Addition

The first class wil be held face-to-face.
Details of lectures (in-person/online) will be discussed during the first class.

<4> Economy and Society

Class Schedule: Wednesday, 1st. (2 credits) Category: Foundations-Social Sciences

Course Code: CB31230 Instructors: Jeremy Ryan September

1. Class Subject

Social Entrepreneurship: An Introduction

2. Object and Summary of Class

In this course students will receive a comprehensive overview of the field of social entrepreneurship. The course will combine theoretical knowledge and practical examples of social entrepreneurship. Students with a more practical interest will be encouraged to develop their own ideas and plans regarding potential social entrepreneurship projects. Thus, this course is designed for students who want to explore social enterprise start-ups, as well as those students who are just curious about the field and want to learn more about entrepreneurship.

This course also explores the role of Social Entrepreneurship as a lever for economic, social and sustainable development. The subject of Social Entrepreneurship overlaps with a number of fields including the nonprofit sphere, development projects, SMEs, community initiatives and others. This multiplicity will be reflected in the course contents.

3. Goal of Study

1)For students to acquire foundational knowledge of social entrepreneurship theory.

2)For students to acquire a broad understanding of the operation of a social enterprise

3)For students to deepen their understanding by exploring their particular interests within this field through class discussion and assignments.

4. Contents and Progress Schedule

Lesson 1: Background, Characteristics and Context of Social Entrepreneurship

Focus: Introduction to the course.

The evolution and historical background of social entrepreneurship.

Lesson 2: Social Entrepreneurship Defined

Focus:Define the central elements of social innovation.

Identify the different types of social innovation.

Lesson 3: Value Creation in social ventures

Focus:Define what the creation of value is.

Analyze the value proposition by social innovation

Lesson 4: Social Entrepreneurs and their Personality

Focus:Understand the role of personality in entrepreneurship studies.

Describe the current knowledge on the personality in social entrepreneurs.

Lesson 5: Human Resource Management and Volunteer Motivation

Focus:Understand the special characteristics of volunteers.

Illustrate the theoretical elements in a practical context.

Lesson 6: Collaborations and Partnerships

Focus: Explain the reasoning behind social venture partnerships

Discuss the collaborative value chain integration and specific types of collaboration.

Lesson 7: Business Models in Social Entrepreneurship

Focus:Explain what a business model is.

Explain the differences between business models of commercial enterprises and business models of social enterprises.

Lesson 8: Marketing a Social Enterprise

Focus:Generate an awareness of the characteristics of marketing in social enterprises

Understand a systematic approach to marketing in terms of a concerted marketing conception.

Lesson 9: Financing of Social Entrepreneurship

Focus:Describe the characteristics of the financing structure of social enterprises.

Explain the financing instruments available for social enterprises.

Explain the trade-off between social and financial return.

Lesson 1o: Performance Measurement and Social Entrepreneurship

Focus:Understand the origins of the current momentum in measuring social impact

Critically evaluate efforts to measure social impact

Lesson 11: Student Presentations: The first round of students' group presentations

Lesson 12: Student presentations: The second round of students' group presentations

Lesson 13: New Technologies and perspectives

Focus: An explanation of the most disruptive technologies being developed and their potential influence on social entrepreneurship

Lesson 14: Innovative Case Study

Focus:A description of a The Grassroots Economics Foundation in Kenya and their innovative work.

Lesson 15: Course Reflection - Students also have group discussions regarding their reflections of the course.

5. Evaluation Method

Minute Paper and Contributions for the development of the Class: 50%
Group Presentations 20%, Final Essay 30%

6. Textbook and References

Social Entrepreneurship and Social Business Christine K. VolkmannKim Oliver TokarskiKati Ernst SpringerLink 2012 e-book

7. Preparation and Review

The students will be provided with material and readings for each lecture. They will be expected to read in advance so as to contribute towards class discussion.

8. Students must bring their own computers to class

Yes. As this course will be an online course, students will need access to a computer

<5> Chemistry A

Class Schedule: Wednesday, 2nd. (2 credits) Category: Basics of Discipline-Basics of Chemistry

Course Code: CB32225 Instructors: Mott Derrick

1. Class Subject

Introduction to Chemistry, Atoms and Molecules

2. Object and Summary of Class

Chemistry includes the fundamental analysis of atoms and molecules, which make up the world around us. By understanding the basics of atomic structure, reactivity and the formation of molecules, it is possible to create new substances with uses in advanced applications including medicine, energy, materials, environmental quality and others. The goal of this class will be to become familiar with the basics of chemistry, understand what atoms are composed of and their structure, learn about compounds, how to study these materials, and how they may be used to improve quality of human life.

3. Goal of Study

Gain an understanding of fundamental chemistry, what are atoms, understand their composition and structure.
Learn about electronic structure of atoms, how it influences chemical reactions and material formation.
Become familiar with different types of chemical bonds (ionic bonds, covalent bonds, coordination bonds, and metallic bonds).

4. Contents and Progress Schedule

1st: Introduction to chemistry, atomic and electronic structure of simple atoms, fundamental characteristics of atoms
2nd: Atomic and electronic structure of higher atomic number elements
3rd: Periodic properties of elements: Spin quantum number, Pauli exclusion principle
4th: Periodic properties of elements: Effective nuclear charge, electron orbital arrangement
5th: Periodic properties of elements: Ionization energy and electron affinity, electronegativity
6th: Quiz 1, Ionic and metallic bonds
7th: Covalent bonding (1): Octet rule
8th: Covalent bonding (2): Molecular orbital theory (σ bond, π bond, etc.)
9th: Covalent bonding (3): Bonding nature of molecular orbitals and bond order
10th: Covalent bonding (4): Molecular shape, hybrid orbitals and conjugate systems
11th: Quiz 2, Intermolecular force, hydrogen bonds
12th: Analyzing materials: Spectroscopy techniques
13th: Crystalline solids, amorphous materials, metallic glasses
14th: Technological advancement and chemistry: Applications of chemistry in daily life
15th: Introduction to chemistry disciplines
16th: Review, final examination

5. Evaluation Method

Evaluation is based on quizzes (20%), course participation (20%), homework assignments (20%), final examination (20%), and class attendance (20%).

6. Textbook and References

Fundamentals of Physics Halliday & Resnick Wiley

7. URL

8. Preparation and Review

Read the designated textbook sections to prepare for each class.

9. Practical business

10. Students must bring their own computers to class Yes

11. In Addition

<6> Information and Data Literacy

Class Schedule: Thursday, 1st. (2 credits) Category: Advanced Subjects-Information Science and Technology Education
Course Code: CB41216 Instructors: Xavier DAHAN

1. Class Subject

Fundamentals of information science and data

2. Object and Summary of Class

Provide some survival and essential knowledge in the modern digital age: systems, network, cybersecurity, programming, manipulating data, doing some basic data analysis.

3. Goal of Study

1) Raise awareness about the modern issues of science and technology (systems, networks, cybersecurity).
2) Learn basic notions of programming common in most procedural programming languages.
3) Develop computational thinking: convert a problem into a solution implementable in computer.
4) Learn basic of Python
5) Represent data, manipulate data with Pandas' module
6) Perform very basic data analysis with Scikit-learn module

4. Contents and Progress Schedule

1. Orientation. Introduction to computer system tools.
2. Introduction to programming in Python I: variable and assignment. Some DataType.
3. Python II: list and dictionaries.
4. Python III: Boolean tests and if-then-else.
5. Python IV: Iterations. For, while loop.
6. Review
7. Python V: Functions and recursions.
8. Problem solving.
9. Introduction to networks.
10. Introduction to cybersecurity
11. Data Science I: Principles. Introduction to modules NumPy, Matplotlib.pyplot.
12. Review of basic probability, random variables, standard distribution, simple linear regression. Some implementation in Numpy.
13. DataFrames in Pandas.
14. Linear Regression with Scikit-learn module.
15. Classification: logistic regression, clustering. Practice with real data.

5. Evaluation Method

Attendance and participation in class (20%)
Assignments and Quizzes (80%)

6. Textbook and References

コンピューテーショナル・シンキング 磯辺秀司, 小泉英介, 静谷啓樹, 早川美徳 共立出版 2016
情報倫理ケーススタディ 静谷啓樹 サイエンス社 2008

7. URL

8. Preparation and Review

Review materials taught in class, in particular programming exercises given through GoogleColaboratory.
Develop autonomy in programming in Python.

9. Practical business

10. Students must bring their own computers to class No

11. In Addition

<7> Biology A

Class Schedule: Thursday, 4th. (2 credits) Category: Basics of Discipline-Basics of Biology
Course Code: CB44205 Instructors: Toshiharu ICHINOSE, etc.

1. Class Subject

Biology A - Essential Cell Biology

2. Object and Summary of Class

Cells are the structural and functional units of living organisms. Understanding basics of cell biology is essential for studying all areas of life sciences and any related branches of natural sciences. The main objective of this course is to learn the essential principles of cell biology by learning how the living cells are made and operating from a molecular perspective: especially, how DNA, RNA and proteins cooperatively work inside the cells to allow the maintenance, replication and responses to stimuli. Together with Biology B, which will be held in the next spring, the textbook "Essential Cell Biology" will be covered.

3. Goal of Study

Upon finishing this course, students will have a solid grasp of structure of cells and how they replicate themselves, exert cellular functions and communicate with each other. More concretely, intracellular structure and molecular dynamics inside cells, mechanisms of DNA replication, repair and recombination, gene expression and its regulation, and cellular signaling will be introduced. In addition, research topics of the instructors, all of whom are young biologists/biochemists in FRIS, will be introduced so that students will have a glimpse of cutting-edge sciences.
To achieve this, students will need to read one or a half of a chapter of the textbook every week. Mini-quiz will be assigned in each class. Active participation, such as asking questions and discussion in the class, is strongly encouraged.

4. Contents and Progress Schedule

1) General introduction
2) Cells as the fundamental units of life and cell communities (Chap. 1, 20)
3) Chemical components of cells (Chap. 2)
4) Chemical reactions of cells 1 (Catalysis) (Chap. 3)
5) Chemical reactions in cells 2 (Biosynthesis) (Chap. 3)
6) DNA and chromosomes (structure & function) (Chap. 5)
7) DNA replication, repair, & recombination (Chap. 6)
8) From DNA to RNA (transcription & RNA processing) (Chap.7)
9) From RNA to proteins (translation & protein synthesis) (Chap. 7)
10) Control of gene expression 1 (transcriptional controls) (Chap.8)
11) Control of gene expression 2 (post-transcriptional controls) (Chap. 8)
12) Gene and genome evolution (Chap. 9)
13) Cell signaling 1 (principles and concepts) (Chap. 16)
14) Cell signaling 2 (receptors & cell-cell communication) (Chap. 16)
15) Final exam

5. Evaluation Method

Attendance, active participation and weekly mini-quiz (60%) and final exam (40%).

6. Textbook and References

Essential Cell Biology, 4th or 5th Edition Alberts B, Hopkin K, Johnson A, Morgan D, Raff M, Roberts K, Walter P WW Norton & Co 2018 Textbook

7. URL

8. Preparation and Review

Students are expected to spend 2-3 hours per week, reading relevant textbook material, and completing online assignments.

9. Practical business

10. Students must bring their own computers to class No

11. In Addition

1) This is a general, entry-level biology course, open to all students and compulsory for first-year FGL students in the AMB program. High school-level familiarity with basic organic chemistry and biology is expected, but not necessarily.
2) Japanese students and exchange students from any field of study are encouraged to enroll, knowing that this is an introductory course held in English.
3) Instructors are available for questions and consultation upon appointment.

<8> Physics A

Class Schedule: Tuesday, 3rd. (2 credits) Category: Basics of Discipline-Basics of Physics
Course Code: CB51213 Instructors: Takeshi KOIKE

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 and a historical perspective of Newtonian mechanics
1. 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 (coresspondence 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 %), pre-lecture assignment (20%).

6. Textbook and References

Fundamentals of Physics Extended, 11th Edition David Halliday, Robert Resnick, Jearl Walker Wiley 2018 textbook

7. URL

https://www.wileyplus.com/

8. Preparation and Review

A pre-lecture reading of the textbook followed by short adaptive quizzes will be assigned for each lecture. In addition, after each lecture, a set of selected problems from WileyPlus will be assigned.

9. Practical business

10. Students must bring their own computers to class Yes.

Various demonstration/simulation with MATLAB will be performed.

11. In Addition

If you are planning to take Physics B or/and C, you must register for another Physics A, which is targeted for chemistry and engineering majors with highschool-level physics and calculus background.This course requires purchase of the WileyPlus system which costs $45 USD. The system includes an electronic version of the required textbook with many integrated features to facilitate understanding of the subjects and problem solving skills in physics. The system also comes with self-diagnostic adaptive quizzes, 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 during the first lecture.

<9> Introduction of Academic Learning

Class Schedule: Friday, 4th. (2 credits) Category: Foundations-Navigating Academia

Course Code: CB54208 Instructors: Yumiko WATANABE, etc.

1. Class Subject

学問論 Introduction to Academic Learning

2. Object and Summary of Class

This course aims to smooth the transition of studying from overseas high schools to Tohoku University.

The course is designed to assist students in learning about Tohoku University and its contributions to society, about the responsibility of students as members of the academic community of Tohoku University, and to foster their motivation for education and research at Tohoku University.

Through a variety of teaching methods and activities such as lectures, field trips, discussions, writing, & presentations, the course also aims to help students recognize important differences in education between high school and university, including basic attitudes toward education and research in the university.

3. Goal of Study

The learning goals for students taking this course are to

- Learn about the roles of the university and their contributions to society,
- Learn about the education, research, and facilities at Tohoku University,
- Learn about the responsibility of students as members of the academic community of Tohoku University,
- Foster the motivation for education and research at Tohoku University,
- Improve communication skills so as to more effectively deliver and understand ideas through class discussions and presentations.

4. Contents and Progress Schedule

Tentative schedule (The schedule, etc. may be subject to change.)

Class # Date Content Instructor(s)

1 October 6:Orientation including Group Project Overview Y. Watanabe and others

2 October 13:Education and Society by M. Kojima

3 October 20:What happened on March 11, 2011, and how the university responded to that? Guest lecture about IRIDES (facilitated by YW)

October 27:No classes (University Festival)

4,5, 6 November 3 (National Holiday) Field Trip to Tsunami Disaster Area (Arahama & Futaba?) Y. Watanabe & T. Koike

7 November 11:Discussion: What we/university can do for “Fukushima”? T. Koike

8 November 17:Academic Integrity T. Koike

9 November 24:History of Tohoku University-1M. Nakagawa

10 December 1:History of Tohoku University-2 (Katahira Campus) M. Nakagawa

11 December 8:Internationalization at Tohoku University Y. Shimmi

12 December 15:Collaboration with industry Guest lecture about NanoTERASU (facilitated by D. Mott)

13 December 22:Discussion: Group Project Y. Watanabe

December 27:No classes

14 January 5:Group Project Preparation Y. Watanabe

January 12:No classes (Common Test for University Admission)

15 January 19:Group Presentations (20 min x presentation x 3 groups) Y. Watanabe & all

16 January 26:Group Presentations (20 min x presentation x 3 groups) Y. Watanabe & all

5. Evaluation Method

- Attendance and active participation including submission of reflection (40%)
- Completion/Submission of any assignments like a reflection, short study report about a class topic (A4 one-page with using a provided template), etc. (30%)
- Conducting a Gr

6. URL to be announced.

7. Preparation and Review

Reading assigned reference materials and studying a specific topic before a class, conducting a group project “The University and Society”, summarizing what you learn in the class, developing your own idea, and discussing and presenting them in the class.

8. Students must bring their own computers to class Yes

9. In Addition

This is a mandatory course for the FGL 1st-year students who enrolled on October 1, 2023.

<10> Chemistry B

Class Schedule: Monday, 3rd. (2 credits) Category: Basics of Discipline-Basics of Chemistry
Course Code: CB13214 Instructors: Mott Derrick

1. Class Subject

Introduction to Physical Chemistry

2. Object and Summary of Class

Physical chemistry covers the topics of thermodynamics, which governs the flow of energy in a system. The relationship between heat, work, temperature and energy dictate chemical equilibrium and the behavior of atoms and molecules. This course will introduce the fundamentals of physical chemistry covering the topics of entropy, enthalpy and free energy, and will also introduce the technological areas where physical chemistry is used.

3. Goal of Study

Become familiar with the basics of physical chemistry.
Learn about the laws of thermodynamics and how they are used.
Learn about the interplay between preservation of energy, state of system, temperature and other topics.

4. Contents and Progress Schedule

1st: Introduction to chemical thermodynamics
2nd: Kinetic theory of gases
3rd: Kinetic theory of gases and gas equation of state
4th: The first law of thermodynamics: Introduction of gas volume change, work energy and enthalpy
5th: The first law of thermodynamics: Gas heat capacity, gas isothermal change and adiabatic change
6th: Quiz 1, The second law of thermodynamics: Introduction of Carnot cycle and entropy
7th: The second law of thermodynamics: Entropy and its microscopic meaning
8th: The second law of thermodynamics: Free energy and chemical potential
9th: Thermochemistry: Reaction heat, heat of formation, Hess's law, bond energy
10th: Phase equilibrium: Water phase diagram, single component phase equilibrium
11th: Quiz 2, Phase equilibrium: Liquid and solid vapor pressure, solution vapor pressure depression
12th: Phase equilibrium: Boiling point elevation, freezing point depression, osmotic pressure
13th: Chemical equilibrium: Equilibrium constant, standard free energy of formation
14th: Modern challenges: Conservation of energy in a thermodynamic chemical system
15th: Physical chemistry used in advanced technological applications
16th: Summary and final examination

5. Evaluation Method

Evaluation is based on quizzes (20%), course participation (20%), homework assignments (20%), final examination (20%), and class attendance (20%).

6. Textbook and References

Fundamentals of Physics Halliday & Resnick Wiley

7. URL

8. Preparation and Review

Read the designated textbook sections to prepare for each class.

9. Practical business

10. Students must bring their own computers to class Yes

11. In Addition

<11> Earth Material Science

Class Schedule: Thursday, 3rd. (2 credits) Category: Basics of Discipline-Basics of Earth and Space Science
Course Code: CB43229 Instructors: Breedlove Brian Keith

1. Class Subject

Earth Material Science

2. Object and Summary of Class

Often we think of rocks as just being rocks without understanding how they formed, their composition or purpose. This goes for the variety of materials that make up the world on which we reside. In this course, we examine how different minerals form and how to identify them and examine the applications of some of the naturally occurring materials.

3. Goal of Study

Goals of this courses include understanding how minerals form and how they are characterized. In addition, students will learn some uses of natural earth materials.

4. Contents and Progress Schedule

This schedule is still tentative...
Week
1. Introduction
2–6 Characterization methods
8–13 Formation of rocks
14–15 Uses, etc.

5. Evaluation Method

Attendance 10%
Reports: midsemester report and end-of-term report (total: 50%)
Exams: midterm and end of term (total: 40%)

6. Textbook and References

Earth Materials: Introduction to Mineralogy and Petrology 2ed. Klein C. and Philpots A. Cambridge University Press 2017 textbook

7. URL

8. Preparation and Review

Students should read the textbook

9. Practical business

10. Students must bring their own computers to class

if they wish to follow the slides/take notes on the slides, they must bring their own computers.

11. In Addition

<12> Calculus A

Class Schedule: Friday, 2nd. (2 credits) Category: Basics of Discipline-Basics of Mathematics

Course Code: CB52220 Instructors: Xavier DAHAN

1. Class Subject

Calculus of functions of the real variable

2. Object and Summary of Class

This is a classical first course of calculus for engineering students. It takes root in Calculus learnt in high-school and brings it to a more advanced/college level. The core of the course is differentiation and integration.

3. Goal of Study

Learn fundamental techniques of calculus of functions of the real variable, especially differentiation and integration.
Learn basic and fundamental applications.
Raise calculation skills. Become confident in conducting substantial calculations as met in Physics, Chemistry, Probability and Statistics, Engineering.

4. Contents and Progress Schedule

1.Introduction. Review of elementary functions.
2. Inverse functions (including some inverse trigonometric functions).
3. Limit of a sequence of numbers, definition and properties of real numbers.
4. Limit of a function and continuity. Intermediate value theorem.
5. Definition of the derivative of a function, differentiability.
6. Calculations of derivatives. Mean value theorem and applications to extrema problems
7. De L'Hospital's rule and practical evaluation of limits.
8. Midterm examination
9. Taylor's expansions, practical calculation.
10. Taylor-Lagrange remainder, application to estimation of the error.
Definition of the Riemann integral and the fundamental theorem of calculus.
11. Antiderivatives of elemententary functions.
Technique of integration I-II: substitution and integration by parts.
12. Technique of integration III: integration of partial rational functions.
13. Technique of integration IV: trigonometric integrands and substitution
14. Area, volume, length.
15. Improper integrals
16. Final examination

5. Evaluation Method

A mix of the final and midterm exams, and reports.

6. Textbook and References

Shaum's outline. Calculus (sixth edition) Frank ayres. Elliott MEndelson McGraw Hill

7. URL

8. Preparation and Review

Each new topic leanrt is accompanied by "practice sheets" that illustrate and deepen each newly introduced material. A selection of these problems will be solved in class. Two to three reports will be assigned and serve to prepare the midterm and final

9. Practical business

10. Students must bring their own computers to class No

11. In Addition

<13> Foundations of Calculus

Class Schedule: Tuesday, 4th. (2 credits) Category: Foundations-Natural Sciences

Course Code: CB24221 Instructors: Xavier DAHAN

1. Class Subject

Foundations of Calculus

2. Object and Summary of Class

Built upon Calculus learnt in high-school, this course prepares to more advanced/academic techniques of essential Calculus. Differential and Integral Calculus are the core of this course.

3. Goal of Study

Learn more advanced techniques of differentiation and integration.
Learn applications of differential and integral calculus.
Be confident to use differential and integral calculus in other courses like Physics and Chemistry, Probability and Statistics.

4. Contents and Progress Schedule

1. Review of essential mathematics notions.
2. Review of functions. Trigonometric functions, inverse trigonometric function.
3. Limits. Continuity.
4. Derivative of a function. Differentiation.
5. Derivatives of usual functions. Product, quotient and chain's rules.
6. Mean value theorem. Min/max problems.
7. De L'Hospital's rule. Computations of limits.
8. Mid-term examination.
9. Integration. Definition and Fundamental Theorem of Calculus.
10. Technique of Integration I: substitution
11. Technique of integration II: integration by parts.
12. Technique of integration III: Integration of rational functions.
13. Technique of integration IV: trigonometric integrands and substitutions
14. Length, area, volume, average.
15. Improper integrals.
16. Final examination.

5. Evaluation Method

A mix of midterm, final, and two reports.

6. Textbook and References

Thomas' Calculus M.-D. Weir. J. Hass PEarson

7. URL

8. Preparation and Review

Each new topic leanrt is accompanied by "practice sheets" that illustrate and deepen each newly introduced material. A selection of these problems will be solved in class. Two or three reports will be assigned and will serve to prepare to the midterm a

9. Practical business

10. Students must bring their own computers to class No

11. In Addition

<14> History

Class Schedule: Friday, 1st. (2 credits) Category: Foundations-Humanities

Course Code: CB51211 Instructors: Godart CLINTON

1. Class Subject

Introduction to the History of Modern Japan: Maritime and Naval History

2. Object and Summary of Class

This course provides an overview of Modern Japanese History (1868-1945), but with a particular focus on naval and maritime history. The sea was central to modernity, capitalism, and empire, including for Japan, an island nation. We will look at changing ideas of Japan's maritime importance and defense, the building of the modern navy, rivalry with the army, propaganda, and more. One aim is to explore how the history of the navy was intertwined with the history of modern Japan and global history. Hence, we will also see how Japan became a colonial empire, and explore major changes in society, thinking, and culture.

3. Goal of Study

Classes will consist of a mix of introductory lectures and discussion of primary sources in English translation. Students are required to prepare the readings, attend class, and participate in discussions. Handouts and other readings will be provided. Students will also conduct a small research group project and present in class.

4. Contents and Progress Schedule

Week 1 Course Orientation
Week 2 Introduction to Naval & Maritime History
Week 3 Maritime Thought & Naval Strategy: Mahan and Corbett
Week 4 The Meiji Restoration
Week 5 The Meiji Navy and the Sino-Japanese War
Week 6 The Russo-Japanese War and The Age of Navalism
Week 7 Interwar Japan and The First World War
Week 9 The Naval Treaty Era
Week 10 Turbulent decade: the 1930's
Week 11 The Road to Pearl Harbor
Week 12 The Second World War at sea: A Global Conflict
Week 13 Legacies and Prospects
Week 14 Student Group Presentations
Week 15 Student Group Presentations

5. Evaluation Method

Assessment will be based mainly on attendance and class participation, and group presentation.

6. Textbook and References

7. URL

8. Preparation and Review

Students are expected to prepare short primary source readings in English, on average around 20 pages before each class.

9. Practical business

10. Students must bring their own computers to class No

11. In Addition

<15> Basic Japanese I

Class Schedule: Monday, 4th / Tuesday, 5th / Thursday, 2nd / Friday, 3rd. (4 credits) Category: Languages-Japanese
Course Code: CB14212 Instructors: Masako HAYASHI, Atsuko UCHIYAMA, Wataru NAKAMURA

1. Class Subject

Japanese for beginners

2. Object and Summary of Class

This class will use Google Classroom.
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 New Friends
6-9. Lesson 2 Shopping
10-13. Lesson 3 Making a Date
14-18. Lesson 4 The First Date
19-23. Lesson 5 A Trip to Okinawa
24-28. Lesson 6 A Day in Robert's Life
29. Midterm exam (Kanji, Grammar, Listening)
30. Midterm exam (Speaking)
31-34. Lesson 7 Family Picture
35-39. Lesson 8 Barbecue
40-44. Lesson 9 Kabuki
45-49. Lesson 10 Winter Vacation Plans
50-54. Lesson 11 After the Vacation
55-58. Lesson 12 Feeling Ill
59-60 Summary

5. Evaluation Method

Homework assignments and class participation 50%, Quizzes 10%, Midterm and final exams 40%

6. Textbook and References

Genki 1, 3rd edition Banno et al. The Japan Times 2020 Textbook

7. URL

Genki-Online https://genki3.japantimes.co.jp/
The Japan Times, Book Club https://bookclub.japantimes.co.jp/en/book/b497763.html

8. Preparation and Review

(1)Those who have no knowledge of the Japanese characters (hiragana, katakana) should learn them as a prerequisite to joining the program.
(2) During the course we expect you to:
1. Submit all homework assignments by due dates. Late work will be marke

9. Practical business

10. Students must bring their own computers to class Yes

11. In Addition

Students are required to purchase the THIRD edition of GENKI 1.