

履修 年度	講義コード	科目名 /Subject	科目名(英)	科目名/Subject	曜日・講時 /Day/Period	科目群/Categories	単位数 /Credit(s)	担当教員(所 属)/Instructor (Position)	セメス ター /Semest er	授業題目/Class Subject	授業の目的と概要/Object and Summary of Class	学習の到達目標/Goal of Study	授業内容・方法と進度予定/Contents and Progress Schedule of the Class
2016	CB11201	情報基礎B	An Introduction to Information Science B	情報基礎B An Introduction to Information Science B	後期 月曜日 1 講時	全学教育科目共通科目-情報科目	2	早川 美徳 所属：教育情報基盤センター	2	Information basics B	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.	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.	1. Orientation 2. Introduction 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. Social skill Responsibility in the information society (part 1) 6. Social skill Responsibility in the information society (part 2) 7. Academic skill II Computational thinking (part 1) "Introduction to C programming" 8. Academic skill II Computational thinking (part 2) "Basic operations and input/output" 9. Academic skill II Computational thinking (part 3) "Conditional branch" 10. Academic skill II Computational thinking (part 4) "Iterations" 11. Academic skill II Computational thinking (part 5) "Algorithms for basic calculations" 12. Academic skill II Computational thinking (part 6) "Arrays and functions" 13. Academic skill II Computational thinking (part 7) "Ways to solve problems with computers (1)" 14. Academic skill II Computational thinking (part 8) "Ways to solve problems with computers (2)" 15. Academic skill II Computational thinking (part 9) "Ways to solve problems with computers (3)"
2016	CB12238	地球物質科学	Mineralogy, Petrology & Geochemistry	地球物質科学 Mineralogy, Petrology & Geochemistry	後期 月曜日 2 講時	全学教育科目展開科目-宇宙地球科学	2	ZHANPEISOV, Nurbosyn 所属：高度教養教育・学生支援機構	2	Fundamentals of crystal structures of solids	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.	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.	Class 1: Introduction to the chemistry and physics of solids, mineralogy Class 2: Amorphous solid, glass and polymer (biopolymer) Class 3: Chemical bonding in solids, coordination number Class 4: Cohesive energies in solids, formation energy of a unit Class 5: Interatomic distances in crystal structures Class 6: Basic structure motifs of crystalline solids Class 7: Anisotropy and the Avogadro constant Class 8: Mid-term test Class 9: Examples of crystal structures Class 10: Magnesium oxide, low coordination ions Class 11: Silica and zeolites Class 12: Titanium dioxides (rutile, anatase, brookite) Class 13: Covalent crystals of carbon Class 14: Metals Class 15: Term-end test
2016	CB13219	線形代数数学概要	Foundations of Linear Algebra	線形代数数学概要 Foundations of Linear Algebra	後期 月曜日 3 講時	全学教育科目展開科目-数学	2	HANSEN FRANK 所属：高度教養教育・学生支援機構	2	Foundations of Linear Algebra	1. Academic aims: An elementary introduction to linear algebra. 2. Keywords: Vectors, matrices, systems of linear equations, determinants, eigenvalues, diagonalization, quadratic forms.	The student will learn fundamental notions of elementary linear algebra, master the sweeping-out (echelon) method to solve systems of linear equations, invert matrices, calculate determinants and eigenspaces, and determine the definiteness of quadratic forms.	Class 1: Vectors in the two-dimensional plane, vector calculus, the dot-product, Cauchy-Schwartz inequality, orthogonal vectors, the angle between two vectors. Class 2: Vectors in the n-dimensional space, vector calculus, the dot-product, Cauchy-Schwartz inequality, orthogonal vectors, the angle between two vectors, lines and hyper planes. Class 3: Matrix addition and scalar multiplication, matrix multiplication, regular matrix, transposed matrix. Class 4: Systems of linear equations, linear equations on matrix form, row operations, echelon form of linear equations. Class 5: Operation matrices, inversion of matrices. Class 6: Exercises on the blackboard. Class 7: Determinants. Class 8: Calculating determinants. Class 9: Eigenvalue and eigenvector. Calculating eigenspaces. Class 10: One hour mid-term test, exercises. Class 11: Diagonalisation of symmetric matrices. Class 12: Quadratic forms. Class 13: Applications in calculus. Interpolation and convex functions of two variables. Class 14: Summary of the course and exercises. Class 15: Examination

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情報基礎B	Midterm and final homework assignments (2 or 3 times): 80% Participation in class: 20%																					Homework assignments are given during semester. In particular, writing documents and making presentation slides with computers will be required in the part of Academic skill I. For Academic skill II, computer programming will be assigned.	Course materials will be distributed with a web-based information service called ISTU. Details about the service will be instructed in the course.
地球物質科学	Evaluation will be based on class attendance, reports and on the results of term-end test.	Physical Chemistry	R.J. Silbey, R.A. Alberty		2000																	We will have a number short as well as mid-term and term-end tests.	The lecture attendance will be strictly controlled.
線形代数概要	Evaluation: By class participation and by the result of the examination.	Introduction to Linear Algebra 2.ed.	Serge Lang	Springer Verlag	2008																https://sites.google.com/site/frankhansentohoku2016	Homework: The students are required to solve excersises for each lecture.	The lecturer prepares presentation files for each lecture and post them on the homepage for the course.

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2016	CB14217	生命と自然	Life and Nature	生命と自然Life and Nature	後期 月曜日 4 講時	全学教育科目基幹科目-自然論	2	ROBERT MARTIN 所属：高度教養教育・学生支援機構	2	Study of Nature, Life and Technology: The organization and evolution of the universe (from the Big Bang to now, in one semester)	<p>This course aims to provide an overview of the natural processes that occurred over a 13.7 billion years and led to the world that surrounds us. One ambition is to help students in various fields appreciate the fundamental importance and interdependence of physical, chemical, biological, and social sciences. The course will provide a broad perspective about this fantastic growth in organization and complexity in the universe throughout its 13.7 billion year history. It will also provide a general foundation for more advanced studies and help students appreciate the deep connections that exist between otherwise seemingly disparate scientific disciplines.</p> <p>Students will explore the origin of our universe and our world, the intricate connectivity in nature, life and 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, the evolution of scientific ideas, and 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.</p> <p>• Big History tells the story of the Universe from the Big Bang to the present, a time span of 13.8 billion years. Big History asks big questions. Among these are: How was the Universe created? Why does it work the way it does? What is life? Why are stars so big? Why are you and I so small?</p>	<p>After this course, the student will have general perspective on 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.</p> <p>Some of the specific learning objectives include:</p> <ul style="list-style-type: none"> - 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. - Critically evaluate, analyze, and synthesize primary and secondary scientific, and technical texts to form well-crafted and carefully supported written and oral arguments. - Analyze various scientific topics using valid reasoning and relevant and sufficient evidence through individual or shared writing, speaking, and other formats. - 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 <p>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, adapted for first year undergraduate curriculum and the limitations of a single semester course.</p>	<ol style="list-style-type: none"> 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: What is Life? 6) Origin of life 7) Mid-term examination <p>Biogeochemical cycles</p> <ol style="list-style-type: none"> 8) The Biosphere, biodiversity and ecosystems 9) Evolution and natural selection 10) Early humans and collective learning 11) Agriculture and civilization 12) Expansion and interconnection 13) The Anthropocene: technologies and economies 14) Acceleration and the Future 15) Final examination
2016	CB15201	Basic Japanese 1	Basic Japanese 1	Basic Japanese 1	後期 月曜日 5 講時 後期 火曜日 5 講時 後期 木曜日 5 講時 後期 金曜日 5 講時	全学教育科目共通科目-留学生対象科目	4	菅谷 奈津恵, 吉本 啓, 内山 敦子 所属：高度教養教育・学生支援機構	2	Japanese for beginners	<p>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.</p>	<p>Students will</p> <ul style="list-style-type: none"> - 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. 	<ol style="list-style-type: none"> 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) 30-34. 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
2016	CB33241	経済学	Economics	経済学 Economics	後期 火曜日 1 講時	全学教育科目展開科目-社会科	2	Dan QIN 所属：経済学研究科	2	Japanese Business and Economics A	<p>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 modelling of such types of behavior.</p>	<p>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.</p>	<p>We will first introduce the economic sense of "rationality" and then discuss several typical behavior deviating from this hypothesis. At the end of this class, students will give presentations about typical nonstandard behaviors in their own culture.</p> <ol style="list-style-type: none"> 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) Giri: The Japanese social obligation 7) Honne to Tatemae: Private vs. public stance in Japan 8) Modelling Giri and Honne to Tatemae: Choice with social norm 9) Kenkyo: The Japanese virtue of modesty 10) Modelling Kenkyo: Multi-dimensional choice 11) Shundan Ishiki: Japanese group consciousness 12) Modelling Shundan Ishiki: Cooperative game 13) Kirituteki (Following rules) and choosing as sampling 14) Student Presentation <p>Week 14 and 15 are reserved for student to make presentations about examples of nonstandard behavior in their own culture.</p> <ol style="list-style-type: none"> 15) Student Presentation <p>Week 14 and 15 are reserved for student to make presentations about examples of nonstandard behavior in their own culture.</p>

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生命と自然	Evaluation will be based on weekly attendance and active participation (10%), completion of in-class activities, exercises and assignments (30%), a team project (20%) as well as a mid-term and final examination (40%).	Big History Project web site					web site	Cosmic evolution	Eric J. Chaisson		2013		web site							https://school.bighistoryproject.com/bhplive https://www.cfa.harvard.edu/~ejchaisson/cosmic_evolution/docs/splash.html	Students will be expected to spend 1-2 hours per week, on average, reviewing video and written documents and doing assignments.	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 and exchange students from various fields are encouraged to take this course, knowing that this is an introductory course that is held in English. There will be many opportunities to listen, read, write and discuss in small groups. 2) Instructor available for questions and consultation during office hours, Thursday 10:00-12:00, and by e-mail (mrobert@m.tohoku.ac.jp).
Basic Japanese 1	1. Exams(Midterm exam: Katakana, Kanji, Grammar, Listening; Final exam (Katakana, Kanji, Grammar, Listening, Writing, Speaking) 60%, 2. Quizzes (Kana, Kanji, vocabulary, grammar) 20%, 3. Homework 10% 4. Class participation 10%	Genki 1, second edition	Banno et al.	The Japan Times	2011	978-4-7890-1440-3	Textbook	Genki 1 Workbook, second edition	Banno et al.	The Japan Times	2011	978-4-7890-1441-0	Textbook							Genki-Online http://genki.japan-times.co.jp/index_en	(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.	
経済学	Students will be evaluated by class participation (40%) and presentation (60%). Grades for the course will be assigned as follows: AA.....Excellent (90-100%) A..... Good (80-89%) B..... Fair (70-79%) C..... Passing (60-69%) D..... Fail (0-59%)	『The Japanese Mind: Understanding Contemporary Japanese Culture』	Davis R. J., Ikeno O.	Tuttle Publishing	2002	0804832951	Textbook	『Advanced Microeconomic Theory』	Jehle G. A., Reny P. J.	Prentice Hall	2011	9780273731917	Reference								After lectures 7, 9, and 11, students are expected to review the contents and think about how the nonstandard behavior discussed in class can be modelled. Students are also required to prepare presentations reflecting typical behavior of their own culture. The preparation should start by the 12th week.	Prerequisite: introductory microeconomics Office hours: by appointment

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2016	CB22238	生命科学 A	Biology A	生命科学 A Biology A	後期 火曜 日 2 講時	全学教育科目展開 科目-生物学	2	ROBERT MARTIN 所 属: 高度教養教 育・学生支援機 構	2	Essential Cell Biology	The cell is the fundamental unit of life. Its basic understanding is essential for any aspiring student or researcher in the natural sciences. The objective of this course is for students to learn the fundamental principles of cell biology by studying the cell structure, organization, and basic biochemical functions and how these relate to the cell's fundamental role in all living systems.	After this course the student will have a solid grasp of basic cellular functions including its components, gene expression, cellular communication and cell division. To do this, details about the main components, structures and functional systems of the cell will be introduced and explored. In addition, the broader picture and the important connectivity among all cellular components and a view of the cell as a non-reducible system will be emphasized. Some of the specific learning objectives include: - Explain the fundamental differences between prokaryotic and eukaryotic cells from both a structural and evolutionary perspective - Understand the function of the main cellular components and how they are connected in the process of the living cell - Describe the basic component and functions of the DNA replication machinery and mechanism, gene expression (transcription and translation) and their regulation - Explain the basic mechanisms of gene and genome evolution - Understand principles of cellular signaling and information processing in cells - Describe the main phases of the cell cycle and regulation as well as the properties of cell communities - Realize the importance of studying the cell in order to understand living organisms, ecosystems, as well as health and diseases. To achieve this, students will complete weekly reading and exercise assignments for the units listed below. Quizzes, in-class group activities and exercises will promote interactions and student learning. In addition to those activities, a mid-term and final exam will be used to evaluate student learning and ability to recognize components, structure and systems of the cell as well as the student ability to extend what they learned to novel contexts.	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) DNA and chromosomes (structure and function) 5) DNA replication, repair, and recombination 6) From DNA to RNA (transcription, RNA processing, and degradation) 7) Mid-term examination From RNA to proteins (translation and protein synthesis, the genetic code, and protein degradation) 8) Gene and genomes (structure, function, and evolution) 9) Analyzing genes and genomes 10) Regulation of gene expression (transcriptional and post-transcriptional mechanisms) and epigenetics (non-genetic means of information storage and transmission) 11) Cell signaling and communication (principles, signals, and receptors) 1 12) Cell signaling and communication (principles, signals, and receptors) 2 13) The cell cycle and cell division (overview, phases, and regulation) 14) Cell communities (extracellular matrix, cells junctions, maintenance) 15) Final examination
2016	CB23230	線形代数学 A	Linear Algebra A	線形代数学 A Linear Algebra A	後期 火曜 日 3 講時	全学教育科目展開 科目-数学	2	TRUSHIN IGOR 所属: 高度教養教 育・学生支援機 構	2	Fundamentals of linear algebra	The purpose of this class is to learn the basic notions and properties of vectors and matrices	One should understand and master methods of dealing with matrices and determinants	1.Properties of real vectors 2.Linear independence and basis 3.Rank of a matrix, sweeping out method 4-5.Addition, scalar and matrix multiplications 6.Regular matrix and basis 7.Determinants 8-9.Fundamental properties of determinants 10-11.Calculation of determinants 12.Cofactor expansion of a matrix 13.Inverse of a matrix 14.Cramer's rule 15.Final examination
2016	CB23232	Sport A	Sports A	Sport A Sports A	Fall, Tue./3rd	全学教育科目共通 科目-保健体育	1	Akira TAMAGAWA School of Medicine 玉川 明朗 所 属: 医学系研究科	2	Badminton	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.	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.	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 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.

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生命科学 A	Attendance and active participation (20%), weekly exercises and assignments (30%), examinations (50%).	Essential Cell Biology, 3rd Edition	Alberts B, Bray D, Lewis J, Raff M, Walter P, Hopkin K, Johnson A, Roberts K	Garland Science	2012		Textbook	Molecular Biology of the Cell. 4th edition	Alberts B, Johnson A, Lewis J, et al.	Garland Science	2002		Online textbook	Essentials of Cell Biology	O'Connor, C. M. & Adams	NPG Education	2014			Nature Scitable eBook	http://www.ncbi.nlm.nih.gov/books/NBK21054/ http://www.nature.com/scitable/ebooks/essentials-of-cell-biology-14749010	Students will be expected to spend 1-2 hours per week, on average, reviewing video and written documents and doing assignments.	1) This is a general, entry-level course that is open to all students and is compulsory for FGL-AMB program students. Although not essential, it is best taken together with Biology B (Essential Biochemistry, Spring 2017) to provide an overall view of cellular functions. Some familiarity with basic organic chemistry and biology is assumed. Japanese and exchange students are encouraged to take this course, knowing that this is an introductory course that is held in English. 2) Alberts' Essential Cell Biology, 3rd and 4th Edition, will be the main reference and several copies of the text will be available for loan at the FGL office. It is an entry-level textbook that comes with a useful DVD. 3) Instructor available for questions and consultation during office hours, Thursday 10:00-12:00, and by e-mail (mrobert@m.tohoku.ac.jp).
線形代数 A	Evaluation will be based on results of a tests and home work	Introduction to Linear Algebra.	Serge Lang	Springer.																	.Review thoroughly by doing homework assignments.		
Sport A	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).																					スポーツ、運動、バドミントンに関する様々な情報（トレーニング理論、ルール等）を調べてもらう。課題内容は授業ごとに適宜提示する。	

履修年度	講義コード	科目名 /Subject	科目名(英)	科目名/Subject	曜日・講時 /Day/Period	科目群/Categories	単位数 /Credit(s)	担当教員(所属)/Instructor (Position)	セメスター /Semester	授業題目/Class Subject	授業の目的と概要/Object and Summary of Class	学習の到達目標/Goal of Study	授業内容・方法と進度予定/Contents and Progress Schedule of the Class
2016	CB23233	Sport A	Sports A	Sport A Sports A	Fall, Tue./3rd	全学教育科目共通科目-保健体育	1	Akira SATO School of Medicine 佐藤 明 所属: 医学系研究科	2	Kyudo (Japanese Archery – Rules of Shooting and Etiquette)	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.	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.	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
2016	CB23234	Sport A	Sports A	Sport A Sports A	Fall, Tue./3rd	全学教育科目共通科目-保健体育	1	Kaori MATSUO, School of Medicine 松生 香里 所属: 医学系研究科	2	Tennis	Changes in the social environment and lifestyles have lead to a decrease in opportunities for exercise, lowered physical fitness, and an increase in lifestyle-related illnesses and stress. Students will gain an understanding of the basic knowledge and physical attainment necessary for health and physical fitness within university life, taking into account changes they will experience in their exercise patterns and daily routines after entering university. Students will attain physical fitness from lifetime sports by actually playing them, improve their abilities and communication skills, and learn life skills that will help them lead full lives as students.	1) (Knowledge/Thought) •Goals and methods will be taught for maintaining/improving health and physical fitness 2) (Technique/Expression) •Specific exercise methods will be implemented to familiarize students with sports and maintain/improve health and physical fitness 3) (Motivation/Interest/Attitude) •Students will be able to engage in sports independently while having enjoyable experiences and communicating.	The first class will consist of guidance. A physical fitness test will be performed in the second class. Following this, students will work towards realizing their athletic potential through tennis during the first part of the term. During the second part of the term, they will engage in a training program to obtain the strength and mobility necessary for maintaining and improving health. Another physical fitness test will be performed in the 14th class, and the 15th class will consist of an overall review (general test and review of individual physical changes). Class 1: Guidance (selection of topics, class outline, things to be aware of), about making class notes Class 2: Physical fitness test (1) Class 3: Basic tennis techniques (ground stroke: forehand, backhand) Students will learn methods of warming up and cooling down in tennis. Class 4: Basic tennis techniques (ground stroke, rally) Building strength and mobility in tennis; training methods (1) Class 5: Tennis (ground stroke, rally, volley) Building strength and mobility in tennis; training methods (2) Class 6: Tennis (ground stroke, rally, volley, serving) Building strength and mobility in tennis; training methods (3) Class 7: Tennis (ground stroke, rally, volley, serving, receiving) Building strength and mobility in tennis; training methods (4) Class 8: Tennis (ground stroke, rally, volley, serve test) Students will learn the rules of the game, form groups, and play a short game. Class 9: Tennis (ground stroke, rally, volley, serving, receiving, game) Students will learn the rules of the game and play a short game, while communicating with other students, in competition with other groups. Class 10: Tennis (ground stroke, rally, volley, serving, receiving, game) Students will learn the rules of the game and play a short game, while communicating with other students, in competition with other groups. Class 11: Fundamentals of strength and mobility building (aerobic exercise) Class 12: Fundamentals of strength and mobility building (stretching, compensation, bodyweight training) Class 13: Fundamentals of strength and mobility building (stretching, compensation, circuit training) Class 14: Physical fitness test (2) Class 15: Conclusion (prepare reports for submission, review out-of-class learning)
2016	CB23235	Sport A	Sports A	Sport A Sports A	Fall, Tue./3rd	全学教育科目共通科目-保健体育	1	Toshihiko FUJIMOTO Center for the Advancement of Higher Education 藤本 敏彦 所属: 高度教養教育・学生支援機構	2	Softball	Changes in the social environment and lifestyles have lead to a decrease in opportunities for exercise, lowered physical fitness, and an increase in lifestyle-related illnesses and stress. Students will gain an understanding of the basic knowledge and physical attainment necessary for health and physical fitness within university life, taking into account changes they will experience in their exercise patterns and daily routines after entering university. Students will attain physical fitness by actually playing a lifetime sport, improve their abilities and communication skills, and learn life skills that will help them lead full lives as students.	1) (Knowledge/Thought) •Goals and methods will be taught for maintaining/improving health and physical fitness 2) (Technique/Expression) •Specific exercise methods will be implemented to familiarize students with sports and maintain/improve health and physical fitness 3) (Motivation/Interest/Attitude) •Students will be able to engage in sports independently while having enjoyable experiences and communicating.	The first class will consist of guidance. A physical fitness test will be performed in the second class. Following this, students will work towards realizing their athletic potential through softball during the first part of the term. During the second part of the term, they will engage in a training program to obtain the strength and mobility necessary for maintaining and improving health. Another physical fitness test will be performed in the 14th class, and the 15th class will consist of an overall review (general test and review of individual physical changes). Class 1: Guidance (selection of issues, class outline, things to be aware of) Class 2: Physical fitness test Class 3: Softball (group learning, variations of catch, fielding practice, kinetic training) Class 4: Softball (group learning, variations of catch, hitting practice, kinetic training) Class 5: Softball (group learning, catch, practice game) Class 6: Softball (group learning, catch, practice game/checking fielding positions) Class 7: Softball (group learning, catch, practice game/anticipating the next play) Class 8: Softball (group learning, catch, practice game/review) Class 9: Softball (test: catch, toss batting) Class 10: Fundamentals of strength and mobility building (aerobic exercise) Class 11: Fundamentals of strength and mobility building (aerobic exercise) Class 12: Fundamentals of strength and mobility building (stretching, bodyweight training) Class 13: Fundamentals of strength and mobility building (stretching, weight training) Class 14: Physical fitness test Class 15: Overall review (general test and review)

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Sport A	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.																					使用できる弓の強さ（バネとしての弾力）は弓を押し開く最大筋力の半分までである。安定した行射をするためには体幹と下半身の筋力も参加することが必要である。より強い弓を安定して制するために体重を利用した自重トレーニングを継続的に行うことを奨める。礼法の動作は身体トレーニングとしての意義を有しているので日常生活に意識して取り入れてほしい。	Archery equipment will be provided by the university. Piercings and other accessories must be removed before class. For safety reasons, please do not wear earrings or other accessories.
Sport A	Students will be evaluated with respect to attainment of goals. The goals are divided as follows: Goal 1 (Knowledge) 25 pts., Goal 2 (Technique) 25 pts., Goal 3 (Attitude) 50 pts. Methods for evaluating each goal are as follows. ・Goal 1: Evaluation of knowledge regarding physical training, general test ・Goal 2: Evaluation of technique during developmental mobility period (ground strokes, rally) ・Goal 3: Evaluation of attitude with respect to class learning activities																					・体力測定の結果から、自己の体力についての理解、また、運動能力の不足部分を理解し、どのようなトレーニングが必要かを調べレポートとして提出する。 ・テニスの基礎知識（歴史、マナー、トレーニング方法）について、各自で情報を取得し、自己学習課題としてレポートとして提出する。 ・テニスのゲームのルールを理解する（授業において、各自・各グループでゲーム進行ができるように学習し、実践する）。	・Attendance (students who ask other students answer roll call for them, leave class early, etc. will be dealt with severely) ・Attitude in class (please participate actively) ・Considerations will be made for students who have to attend official functions (e.g. tournaments for their club activities etc.) ・This class is aimed at beginners. ・Students need not bring any equipment (they may bring their own rackets if they wish). ・Students must wear appropriate clothes and shoes (they should wear shoes that will not damage the tennis court, such as tennis shoes). ・If class must be canceled due to conferences, business trips, etc., a report may be assigned by way of make-up. ・Details will be given during the guidance class.
Sport A	Students will be evaluated with respect to attainment of goals. The goals are divided as follows: Goal 1 (Knowledge) 10%, Goal 2 (Technique) 18%, Goal 3 (Attitude and attendance) 72%. Methods for evaluating each goal are as follows. ・Goal 1: Evaluation of knowledge regarding physical training, general test ・Goal 2: Evaluation of technique during developmental mobility period (catch) ・Goal 3: Evaluation of attitude with respect to class learning activities																					Record number of steps walked every day with a mobile phone application and voluntary exercise (time, strength, item etc...) once a week outside this class.	・Attitude in class (please participate actively) ・Considerations will be made for students who have to attend official functions (e.g. tournaments for their club activities etc.) ・This class is aimed at beginners. ・Students need not bring any equipment. ・Students should wear clothes and shoes appropriate for exercising. ・Details will be given during the guidance class. ・Major repair work for the soccer/rugby field and the baseball field is scheduled this year. Class content may be changed from the syllabus depending on the progress of the repair work. Details will be given during the class selection.

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2016	CB24236	歴史と人間社会	History and Human Society	歴史と人間社会 History and Human Society	後期 火曜日 4 講時	全学教育科目基幹科目-社会論	2	中川 学 所属：高度教養教育・学生支援機構	2	History of Tohoku University	What sort of a university is Tohoku University? This course aims to help students understand the characteristics and uniqueness of Tohoku University from a historical perspective.	The goal is for each of you to acquire the following knowledge and abilities through these lectures. (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.	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
2016	CB32232	化学A	Chemistry A	化学A Chemistry A	後期 水曜日 2 講時	全学教育科目展開科目-化学	2	ZHANPEISOV, Nurbosyn 所属：高度教養教育・学生支援機構	2	Fundamentals of chemical bond theory	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.	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 formation as well as relationships between bond length and electronic configuration. One must understand the nature of bonding responsible for stability of molecular associations.	Class 1: Introduction Class 2: Classical quantum theory and atomic model Class 3: Wave equation and basics of quantum chemistry Class 4: Electronic configuration and periodic table of elements Class 5: Covalent bond and ionic bond Class 6: Electronic structure of positively charged molecular hydrogen and diatomics Class 7: Hybrid molecular orbital and the shape of the polyatomic molecule Class 8: Mid-term test Class 9: Molecular complexes and intermolecular forces Class 10: Approximation methods, Valence-bond (VB) method Class 11: Hueckel theory for ethylene, allyl Class 12: Hueckel theory for butadiene and trimethylenemethane Class 13: Applications to complex organic molecules Class 14: Modern quantum chemistry Class 15: Term-end test
2016	CB42221	芸術の世界	World of Fine Arts	芸術の世界 World of Fine Arts	後期 木曜日 2 講時	全学教育科目基幹科目-人間論	2	芳賀 満 所属：高度教養教育・学生支援機構	2	Japanese Art History	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.	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.	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)
2016	CB43228	化学B	Chemistry B	化学B Chemistry B	後期 木曜日 3 講時	全学教育科目展開科目-化学	2	ZHANPEISOV, Nurbosyn 所属：高度教養教育・学生支援機構	2	Fundamentals of physical chemistry	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.	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.	Class 1: Quantitative concepts of temperature, work, internal energy and heat Class 2: Classical mechanics and Newton's second law of motion Class 3: First law of thermodynamics Class 4: Barometric formula, van der Waals equation, enthalpy and heat capacity Class 5: Carnot heat engine, the second law of thermodynamics Class 6: Entropy, the third law of thermodynamics, thermodynamic equations of state Class 7: Kinetic theory of gases, model of a perfect gas Class 8: Mid-term test Class 9: Types of average speeds, collision with a surface Class 10: Reaction kinetics and reaction rate equation Class 11: First, second and third order reactions Class 12: Reversible first order reaction, parallel first order reaction Class 13: Consecutive first order reaction, mechanisms of chemical reactions Class 14: Radical reactions, unbranched and branched chain reactions Class 15: Term-end test

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歴史と人間社会	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 a final paper (50%). *Student will write summary of lecture or some questions in the Minute Paper.	Handout will be distributed in each period. Reference books will be introduced as appropriate.																				Students will be requested to write a paper after each field trip. Students will be requested to write a final paper at the end of the semester.	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 Thursdays. Make an appointment in advance via e-mail or other means. E-mail: manabun@m.tohoku.ac.jp.	
化学A	Evaluation will be based on class attendance, reports and on the results of term-end test.	Physical Chemistry	Ira N. Levine		2008			Physical Chemistry: A Molecular Approach	D.A. McQuarrie and J.D. Simon		1997											We will have a number of short as well as mid-term and term-end tests.	The lecture attendance will be strictly controlled.	
芸術の世界	Evaluation will be based on final report (70%), performance in the class room (30%).	A History of Japanese Art	Noritake TSUDA	Tuttle Publishing	2009	9784805310311																The session time is limited and therefore self-directed learning is important. Students are required to prepare and review for each class.		
化学B	Students must attend all these lectures. Evaluation will be based on class attendance, on the results of short and term-end tests, home works and reports.	Physical Chemistry	Ira N. Levine		2008			Physical Chemistry	R.J. Silbey, R.A. Alberty and M.G. Bawendi		2005			Atkins' Physical Chemistry	P. Atkins and J. de Paula		2006						We will have a number of short as well as mid-term and term-end tests.	The lecture attendance will be strictly controlled.

履修 年度	講義コード	科目名 /Subject	科目名(英)	科目名/Subject	曜日・講時 /Day/Period	科目群/Categories	単位数 /Credit(s)	担当教員(所 属)/Instructor (Position)	セメス ター /Semest er	授業題目/Class Subject	授業の目的と概要/Object and Summary of Class	学習の到達目標/Goal of Study	授業内容・方法と進度予定/Contents and Progress Schedule of the Class
2016	CB44205	体と健康	Health	体と健康Health	後期 木曜 日 4 講時	全学教育科目共通 科目-保健体育	2	永富 良一 所 属：医工学研究 科	2	Health Science	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.	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.	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.
2016	CB52208	解析学 A	Calculus A	解析学 A Calculus A	後期 金曜 日 2 講時	全学教育科目展開 科目-数学	2	TRUSHIN IGOR 所属：高度教養 教育・学生支援 機構	2	Calculus of functions of one variable	The purpose of this class is to learn the basic notions of derivative and integral	One should understand fundamental definitions and theorems of calculus, master the basic techniques and applications which accompany them.	1.Properties of real numbers 2.Limits of sequences and functions 3.Basic elementary functions, trigonometric functions, inverse functions 4.Continuous functions 5.The definition of derivative 6.The mean value theorem 7.L'Hospital's rule 8.Higher order derivatives 9.Taylor formula and Taylor series 10.Applications of derivatives, minimum and maximum values. 11.Indefinite integrals, computing basic indefinite integrals 12.Riemann integral and its properties 13.Improper integrals 14.Applications of integration 15.Final examination
2016	CB53208	解析学概要	Foundations of Calculus	解析学概要 Foundations of Calculus	後期 金曜 日 3 講時	全学教育科目展開 科目-数学	2	HANSEN FRANK 所属： 高度教養教育・ 学生支援機構	2	Foundations of Calculus	1. Academic Aims: An elementary introduction to calculus for functions of one or two variables. 2. Keywords: Continuity, derivative, integral, convex function, extreme value problems for functions of one or two variables, double integral.	The student will learn the notions of limit, continuity and differentiability, master differentiation, integration and extreme value problems for functions of one or two variables.	Class 1: Sets and functions, infimum and supremum, sequence and convergence, proof by induction. Class 2: Continuity and differentiability, calculating with derivatives. Class 3: The extreme value theorem, the mean value theorem, De L'Hospital's rule. Class 4: Area and integration. Class 5: The logarithm, the exponential function, and the trigonometric functions. Class 6: Exercises on the blackboard. Class 7: Higher order derivatives. Taylor's and MacLaurin's theorems. Class 8: Convex functions of one variable. Extreme value problems. Class 9: The indefinite integral of rational functions. Class 10: One hour mid-term test, exercises. Class 11: Partial derivatives and total differentiation. Class 12: Extreme value problems for functions of two variables. Class 13: Double integrals and polar coordinates Class 14: Summary of the course and exercises. Class 15: Examination.
2016	CB53209	Sport A	Sports A	Sport A Sports A	Fall, Fri./3rd	全学教育科目共通 科目-保健体育	1	Akira SATO School of Medicine 佐藤 明 所属： 医学系研究科	2	Kyudo (Japanese Archery – Rules of Shooting and Etiquette)	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.	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.	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 ("Tateyokujumonji," "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

科目名 /Subject	成績評価方法/Evaluation Method	教科書および参考書 /Textbook and References-1-書名	教科書および参考書/Textbook and References-1-著者名	教科書および参考書 /Textbook and References-1-出版社	教科書および参考書 /Textbook and References-1-出版年	教科書および参考書 /Textbook and References-1-ISBN/IS	教科書および参考書 /Textbook and References-1-資料種別	教科書および参考書 /Textbook and References-2-書名	教科書および参考書 /Textbook and References-2-著者名	教科書および参考書 /Textbook and References-2-出版社	教科書および参考書 /Textbook and References-2-出版年	教科書および参考書 /Textbook and References-2-ISBN/IS	教科書および参考書 /Textbook and References-2-資料種別	教科書および参考書 /Textbook and References-3-書名	教科書および参考書 /Textbook and References-3-著者名	教科書および参考書 /Textbook and References-3-出版社	教科書および参考書 /Textbook and References-3-出版年	教科書および参考書 /Textbook and References-3-ISBN/IS	教科書および参考書 /Textbook and References-3-資料種別	関連URL/URL	授業時間外学習/Preparation and Review	その他/In Addition	
体と健康	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.																					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.	
解析学 A	Evaluation will be based on results of a tests and home work	Calculus: An intuitive and Physical Approach	Morris Kline	Dover Publications.																		. Review thoroughly by doing homework assignments.	
解析学概要	Evaluation: By class participation and by the result of the examination.	Calculus: An intuitive and Physical Approach 2.ed.	Morris Kline	Dover Publications	1998															https://sites.google.com/site/frankhansentohoku2016	Homework: The students are required to solve excersises for each lecture.	The lecturer prepares presentation files for each lecture and post them on the homepage for the course.	
Sport A	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.																					使用できる弓の強さ（バネとしての弾力）は弓を押し開く最大筋力の半分までである。安定した行射をするためには体幹と下半身の筋力も参加することが必要である。より強い弓を安定して制するためにも体重を利用した自重トレーニングを継続的に行うことを奨める。礼法の動作は身体トレーニングとしての意義を有しているので日常生活に意識して取り入れてほしい。	Archery equipment will be provided by the university. Piercings and other accessories must be removed before class. For safety reasons, please do not wear earrings or other accessories.

履修年度	講義コード	科目名/Subject	科目名(英)	科目名/Subject	曜日・講時/Day/Period	科目群/Categories	単位数/Credit(s)	担当教員(所属)/Instructor (Position)	セメスター/Semester	授業題目/Class Subject	授業の目的と概要/Object and Summary of Class	学習の到達目標/Goal of Study	授業内容・方法と進度予定/Contents and Progress Schedule of the Class
2016	CB53210	Sport A	Sports A	Sport A Sports A	Fall, Fri./3rd	全学教育科目共通科目-保健体育	1	Kaori MATSUO, School of Medicine 松生 香里 所属:医学系研究科	2	Tennis	Changes in the social environment and lifestyles have lead to a decrease in opportunities for exercise, lowered physical fitness, and an increase in lifestyle-related illnesses and stress. Students will gain an understanding of the basic knowledge and physical attainment necessary for health and physical fitness within university life, taking into account changes they will experience in their exercise patterns and daily routines after entering university. Students will attain physical fitness from lifetime sports by actually playing them, improve their abilities and communication skills, and learn life skills that will help them lead full lives as students.	1) (Knowledge/Thought) •Goals and methods will be taught for maintaining/improving health and physical fitness 2) (Technique/Expression) •Specific exercise methods will be implemented to familiarize students with sports and maintain/improve health and physical fitness 3) (Motivation/Interest/Attitude) •Students will be able to engage in sports independently while having enjoyable experiences and communicating.	The first class will consist of guidance. A physical fitness test will be performed in the second class. Following this, students will work towards realizing their athletic potential through tennis during the first part of the term. During the second part of the term, they will engage in a training program to obtain the strength and mobility necessary for maintaining and improving health. Another physical fitness test will be performed in the 14th class, and the 15th class will consist of an overall review (general test and review of individual physical changes). Class 1: Guidance (selection of topics, class outline, things to be aware of), about making class notes Class 2: Physical fitness test (1) Class 3: Basic tennis techniques (ground stroke: forehand, backhand) Students will learn methods of warming up and cooling down in tennis. Class 4: Basic tennis techniques (ground stroke, rally) Building strength and mobility in tennis; training methods (1) Class 5: Tennis (ground stroke, rally, volley) Building strength and mobility in tennis; training methods (2) Class 6: Tennis (ground stroke, rally, volley, serving) Building strength and mobility in tennis; training methods (3) Class 7: Tennis (ground stroke, rally, volley, serving, receiving) Building strength and mobility in tennis; training methods (4) Class 8: Tennis (ground stroke, rally, volley, serve test) Students will learn the rules of the game, form groups, and play a short game. Class 9: Tennis (ground stroke, rally, volley, serving, receiving, game) Students will learn the rules of the game and play a short game, while communicating with other students, in competition with other groups. Class 10: Tennis (ground stroke, rally, volley, serving, receiving, game) Students will learn the rules of the game and play a short game, while communicating with other students, in competition with other groups. Class 11: Fundamentals of strength and mobility building (aerobic exercise) Class 12: Fundamentals of strength and mobility building (stretching, compensation, bodyweight training) Class 13: Fundamentals of strength and mobility building (stretching, compensation, circuit training) Class 14: Physical fitness test (2) Class 15: Conclusion (prepare reports for submission, review out-of-class learning)
2016	CB53211	Sport A	Sports A	Sport A Sports A	Fall, Fri./3rd	全学教育科目共通科目-保健体育	1	Toshihiko FUJIMOTO Center for the Advancement of Higher Education 藤本 敏彦 所属:高度教養教育・学生支援機構	2	Softball	Changes in the social environment and lifestyles have lead to a decrease in opportunities for exercise, lowered physical fitness, and an increase in lifestyle-related illnesses and stress. Students will gain an understanding of the basic knowledge and physical attainment necessary for health and physical fitness within university life, taking into account changes they will experience in their exercise patterns and daily routines after entering university. Students will attain physical fitness by actually playing a lifetime sport, improve their abilities and communication skills, and learn life skills that will help them lead full lives as students.	1) (Knowledge/Thought) •Goals and methods will be taught for maintaining/improving health and physical fitness 2) (Technique/Expression) •Specific exercise methods will be implemented to familiarize students with sports and maintain/improve health and physical fitness 3) (Motivation/Interest/Attitude) •Students will be able to engage in sports independently while having enjoyable experiences and communicating.	The first class will consist of guidance. A physical fitness test will be performed in the second class. Following this, students will work towards realizing their athletic potential through softball during the first part of the term. During the second part of the term, they will engage in a training program to obtain the strength and mobility necessary for maintaining and improving health. Another physical fitness test will be performed in the 14th class, and the 15th class will consist of an overall review (general test and review of individual physical changes). Class 1: Guidance (selection of issues, class outline, things to be aware of) Class 2: Physical fitness test Class 3: Softball (group learning, variations of catch, fielding practice, kinetic training) Class 4: Softball (group learning, variations of catch, hitting practice, kinetic training) Class 5: Softball (group learning, catch, practice game) Class 6: Softball (group learning, catch, practice game/checking fielding positions) Class 7: Softball (group learning, catch, practice game/anticipating the next play) Class 8: Softball (group learning, catch, practice game/review) Class 9: Softball (test: catch, toss batting) Class 10: Fundamentals of strength and mobility building (aerobic exercise) Class 11: Fundamentals of strength and mobility building (aerobic exercise) Class 12: Fundamentals of strength and mobility building (stretching, bodyweight training) Class 13: Fundamentals of strength and mobility building (stretching, weight training) Class 14: Physical fitness test Class 15: Overall review (general test and review)
2016	CB54207	物理学A	Physics A	物理学A Physics A	後期 金曜日 4 講時	全学教育科目展開科目-物理学	2	カローウ綿村ウルスラ 所属:	2	Mechanics	Foundations of kinematics and dynamics are introduced. Kinematics describes the motion of bodies in space by giving their position as a function of time. In Dynamics we study how different types of bodies respond to the forces acting on them. In this context the conserved physical quantities are introduced.	The kinematics describing various motions of particles in space is studied by making use of vector calculus and solving the corresponding differential equations of motions. Then forces and interaction are introduced along with Newton's three laws of motion. After introducing the concept of conserved physical quantities we study Newton's law of gravitation, Kepler's laws, pendulum and collision problems. Finally, the description of a rigid body is introduced and its angular kinematics and rotational dynamics are studied.	Schedule of class: 1. Kinematics: position and displacement, velocity, acceleration, motion with constant velocity, motion with constant acceleration 2. Motion in space and vectors; position vector and displacement vector, velocity vector and acceleration vector, uniform circular motion, SHM 3. Inner product and exterior product of vectors; relative velocity in d= 1,2,3 dimensions 4. Dynamics: Force and interactions, Newton's first law, Newton's second law, mass and force, about units, Newton's third law 5. practice on Newton's laws; forces in circular motion, friction forces 6. Kinetic energy, work, power 7. Midterm test 8. Conserved physical quantities; potential energy, energy conservation, force from potential energy 9. Newton's law of gravitation; gravitational force, weight, gravitational potential energy 10. Angular momentum, torque, central force 11. Kepler's three laws 12. Momentum, impulse and conservation of momentum, center of mass, collisions 13. Rigid bodies: angular kinematics, moment of inertia, rotational kinetic energy 14. Torque, rotational dynamics, equilibrium condition, work done by a torque 15. Final exam

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Sport A	Students will be evaluated with respect to attainment of goals. The goals are divided as follows: Goal 1 (Knowledge) 25 pts., Goal 2 (Technique) 25 pts., Goal 3 (Attitude) 50 pts. Methods for evaluating each goal are as follows. Goal 1: Evaluation of knowledge regarding physical training, general test Goal 2: Evaluation of technique during developmental mobility period (ground strokes, rally) Goal 3: Evaluation of attitude with respect to class learning activities	・体力測定の結果から、自己の体力についての理解、また、運動能力の不足部分を理解し、どのようなトレーニングが必要かを調べレポートとして提出する。 ・テニスの基礎知識（歴史、マナー、トレーニング方法）について、各自で情報を取得し、自己学習課題としてレポートとして提出する。 ・テニスのゲームのルールを理解する（授業において、各自・各グループでゲーム進行ができるように学習し、実践する）。	・Attendance (students who ask other students answer roll call for them, leave class early, etc. will be dealt with severely) ・Attitude in class (please participate actively) ・Considerations will be made for students who have to attend official functions (e.g. tournaments for their club activities etc.) ・This class is aimed at beginners. ・Students need not bring any equipment (they may bring their own rackets if they wish). ・Students must wear appropriate clothes and shoes (they should wear shoes that will not damage the tennis court, such as tennis shoes). ・Details will be given during the guidance class. ・出席状況（代返や無断早退等には厳しく対応します） ・授業態度（積極的に授業に参加して下さい） ・公式行事（例：部活動の公式戦など）、忌引きは考慮します。 ・初心者にも対応します。 ・用具の準備は必要ありません（ラケットは個人での持参も可能）。 ・服装はジャージと運動靴で行います（テニスコートを傷めないように、テニスシューズを履くことががのぞましい）。 ・学会出張などで、止むを得ず休講となった場合は、レポート提出として代替措置を取ることがあります。 ・詳しくはガイダンス時にお話しします。																		・体力測定の結果から、自己の体力についての理解、また、運動能力の不足部分を理解し、どのようなトレーニングが必要かを調べレポートとして提出する。 ・テニスの基礎知識（歴史、マナー、トレーニング方法）について、各自で情報を取得し、自己学習課題としてレポートとして提出する。 ・テニスのゲームのルールを理解する（授業において、各自・各グループでゲーム進行ができるように学習し、実践する）。	・Attendance (students who ask other students answer roll call for them, leave class early, etc. will be dealt with severely) ・Attitude in class (please participate actively) ・Considerations will be made for students who have to attend official functions (e.g. tournaments for their club activities etc.) ・This class is aimed at beginners. ・Students need not bring any equipment (they may bring their own rackets if they wish). ・Students must wear appropriate clothes and shoes (they should wear shoes that will not damage the tennis court, such as tennis shoes). ・If class must be canceled due to conferences, business trips, etc., a report may be assigned by way of make-up. ・Details will be given during the guidance class.	
Sport A	Students will be evaluated with respect to attainment of goals. The goals are divided as follows: Goal 1 (Knowledge) 10%, Goal 2 (Technique) 18%, Goal 3 (Attitude and attendance) 72%. Methods for evaluating each goal are as follows. Goal 1: Evaluation of knowledge regarding physical training, general test Goal 2: Evaluation of technique during developmental mobility period (catch) Goal 3: Evaluation of attitude with respect to class learning activities																					毎日の「歩数」の記録および、週1回60分の自主的運動とその記録 Recording the number of steps on every day by mobile phone application software and about voluntarily exercise (time, strength, item etc...) once a week except this class.	・Attitude in class (please participate actively) ・Considerations will be made for students who have to attend official functions (e.g. tournaments for their club activities etc.) ・This class is aimed at beginners. ・Students need not bring any equipment. ・Students should wear clothes and shoes appropriate for exercising. ・Details will be given during the guidance class. ・Major repair work for the soccer/rugby field and the baseball field is scheduled this year. Class content may be changed from the syllabus depending on the progress of the repair work. Details will be given during the class selection.
物理学 A	Evaluation based on: midterm test (40%), final exam (45%), homework problems (10%), class attendance (5%)	University Physics	Sears and Zemansky	Pearson		987-0-321-89470-0	Reference															Basic knowledge of differentiation and integration	The reference mentioned above is meant as a guideline. contact: ursula@tuhep.phys.tohoku.ac.jp