Table： Space Engineering International Course (SEIC) Subjects ＜2018＞

Subjects	Lecturer	Credits	Syllabus				Master program				Doctoral program	Note
			Summary / Outline	Topics / Subject of Class / Schedule	Method of Evaluation	Additional Work / Text Book / Notification	1st Semester		2nd Semester			
							1st quarter	2nd quarter	3rd quarter	4th quarter		
Introduction to Satellite Engineering	CHO Mengu	2	The purpose of this lecture is to provide an overview of satellite engineering with its emphasis on micro- and nano-satellite technologies and systems engineering approach such as verification and test.	1. Introduction 2. Propulsion Basics 3. Propulsion System 4. Orbital Mechanics 5. Mission Analysis part.1 6. Mission Analysis part.2 7. Mission Analysis (constellation) 8. Electrical Power Systems 9. Prelaunch Environment and Spacecraft Structures 10. Spacecraft Dynamics and Attitude Control part.1 11. Spacecraft Dynamics and Attitude Control part.2 12. Thermal Control 13. Communication part.1 14. Communication part.2 15. Small Satellite Engineering	Home works and discussion in the class	Download and read the lecture material before each lecture. Textbook 1. Spacecraft Systems Engineering, edited by Peter Fortescue et al., Wiley Reference book 2. Space Mission Analysis and Design, Third Edition, edited by James Werts and Wiley Larson, Space Technology Library 3. Space Vehicle Design, second edition, Michael Griffin and Jame French, AIAA This lecture is provided in English. It is desirable for students to take Spacecraft Environmental Interaction Engineering (宇宙環境技術特論) as well.				○		
Satellite Power System Ⅰ	CHO Mengu IMAIZUMI Mitsuru KAWAKITA Shirou NAITOU Hitoshi KUSAWAKE Hiroaki NOZAKI Yukishige	1	Power system is one of the most important subsystems to determine the fate of satellite mission. Without power, a satellite is useless. This lecture provides introduction of satellite power system from individual elements to overall pictures, as well as future prospect.	1. Architecture of electrical power system 2. Photovoltaic-Battery System 3. Power system design 4. Solar cell principle 5. Space solar cell state-of-art 6. Environmental effect 7. Environmental effect 8. Solar array system	Reports and mini tests	Read a paper listed as reference during each lecture Reference book; Spacecraft Power Systems by Mukun R. Patel, CRC Press, 2005 This lecture is provided in English. It is desirable for students to take Space Systems Engineering (宇宙システム工学) and/or Introduction to Satellite Engineering (衛星工学入門) as well. It is strongly recommended to take Satellite Power System B with this subject.			○			
Satellite Power System Ⅱ	CHO Mengu IMAIZUMI Mitsuru KAWAKITA Shirou NAITOU Hitoshi KUSAWAKE Hiroaki NOZAKI Yukishige	1	Power system is one of the most important subsystem to determine the fate of satellite mission. Without power, a satellite is useless. This lecture provides introduction of satellite power system from individual elements to overall pictures, as well as future prospect.	1. Battery 2. Space battery state-of-art 3. Battery safet 4. Power control algorithm 5. Power control hardware 6. Reliability 7. High voltage power system 8. Small satellite power system	Reports and mini tests	Read a paper listed as reference during each lecture Reference book; Spacecraft Power Systems by Mukun R. Patel, CRC Press, 2005 This lecture is provided in English. It is desirable for students to take Space Systems Engineering (宇宙システム工学) and/or Introduction to Satellite Engineering (衛星工学入門) as well. It is strongly recommended to take Satellite Power System I before taking this subject.				○		
Space Environment Testing	CHO Mengu	2	A satellite is exposed to extreme environments such as vacuum, radiation and plasma. It is also exposed to severe vibration and shock onboard a rocket. Satellites have to operate maintenance-free and need to be tested thoroughly before the launch. The purpose of the lectures is to understand from the basics about necessity, background of test levels and conditions, judgment criteria of each test.	1. Space environment tests, why necessary? 2. Satellite development and test strategy 3. Vibration test principle 4. Vibration test methods and analysis 5. Shock test principle 6. Shock test and analysis 7. Thermal vacuum test principle 8. Thermal vacuum test method and analysis 9. Thermal vacuum or thermal cycle 10. Antenna and communication test 11. EMC test 12. Outgas test 13. Radiation test 14. Radiation test 15. Test standard	Reports and mini-test	Download and read the lecture material before each lecture. HARRIS' SHOCK AND VIBRATION HANDBOOK, Allan G. Piersol, Thomas L. Paez, Macgrawhill, Spacecraft Thermal Control Handbook, David G. Gilmore, Aerospace Press JAXA-JERG-2-130「宇宙機一般試験標準」 SMC-S-016 "TEST REQUIREMENTS FOR LAUNCH, UPPER-STAGE AND SPACE VEHICLES" ISO-15864 " Space systems — General test methods for space This lecture is provided in English. It is desirable for students to take space system related subjects, such as Space Systems Engineering and Introduction to Satellite Engineering. Also, laboratory workshop will be held in Space Environment Testing Workshop	○					
Spacecraft Environment Interaction Engineering	CHO Mengu AKAHOSHI Yasuhiro TOYODA Kazuhiro KIMOTO Yugo KOGA Seiichi	2	極限環境である宇宙空間において動作を要求される宇宙機には、地上用機器では考慮されない特殊な環境要因への対処が要求される。宇宙環境の特殊性について理解を深めると共に、耐宇宙環境技術の研究開発に必要な基礎知識を習得する。本講義は、宇宙環境技術研究ラボラトリ所属教員と関連分野から招いた学内外講師により行う。	(1) 宇宙環境概説1 (2) 宇宙環境概説2 (3) 宇宙プラズマ環境 (4) プラズマ物理 (5) 宇宙機帯電解析 (6) 宇宙機帯電放電試験1 (7) 宇宙機帯電放電試験2 (8) スペースデブリ1 (9) スペースデブリ2 (10) 宇宙材料劣化1 (11) 宇宙材料劣化2 (12) 宇宙放射線環境1 (13) 宇宙放射線環境2 (14) 宇宙機汚染1 (15) 宇宙機汚染2	複数回のレポートを課す	事前に配布資料がある場合には、次回講義の該当箇所を読んでおくこと。また、授業中に不明な専門用語があった場合には次回までに調べておくこと。 (1) D. E. Hastings and H. Garret, Spacecraft Environment Interaction, Cambridge University Press 宇宙工学についての基礎知識を有すること		○				
Advanced Course of Aerospace Guidance and Control	YONEMOTO Koichi	2	The objective of this lecture (conducted in English) is to gain the knowledge of the basic theory of flight dynamics, guidance and control, and their application to aircraft and spacecraft.	You will learn the basic theory of flight dynamics, guidance and control of aircraft in the first half of lecture, and those of spacecraft in the latter half. Ⅰ. Aircraft (1) Introduction to Aircrafft (2) Aircraft Systems (3) Fight Control Systems (4) Equations of Motion and Linearization (5) Stability and Trim Performance (6) Aircraft Dynamic and Control (7) Stability Augmentation Ⅱ. Spacecraft (1) Introduction to Attitude Control of Spacecraft (2) Definition of Attitude and Equations of Motions (3) Feedback Control with On-Off Thrusters (4) Attitude Control with Reaction Wheels (5) Attitude Stabilization with Spin (6) Gravity Gradient Torque and Attitude Stabilization (7) Geomagnetic Field, Solar Radiation Pressure and Aerodynamic Torque (8) Spacecraft Sensor and Attitude Determination (9) Translational Motions in Circular Orbit Ⅲ. Rocket (1) Introduction to Rocket (2) Navigation Guidance and Control	Grade is evaluated by taking the score of final exam or submission of reports into account.	Learn the class topics by reading the references in advance, and review the distributed prints to resolve all the questions. [1] Bakelock, Jphn, H., "Automatic Control of Aircraft and Missiles," John Wiley and Sons Inc. (1965). [2] McRouer, Duane, et.al, "Aircraft Dynamics and Automatic Control," Princeton University Press (1973). [3] McLean Dnald, "Automatic Flight Control Systems," Prentice Hall International Ltd. (1990年). [4] 加藤寛一朗他：航空機力学入門, 東京大学出版会 (1982). [5] Vladimir A. Chobotov: Spacecraft Attitude Dynamics and Control, Krieger Publishing Company (1991). [6] Marcel J. Sidi: Spacecraft Dynamics and Control, Cambridge University Press (1997). [7] Peter C. Hughes: Spacecraft Attitude Dynamics, Dover Publications, Inc. (2004). [8] Anton H.J. De Ruiter, et al., "Spacecraft Dynamics and Control" John Wilky & Sons (2013). [9] 茂原正道：宇宙工学入門, 培風館 (1995年). It is desirable or recommended for the students to take courses related to "Fluid Dynamics (Aerodynamics)" , "Dynamics of Machinary" and "Control Engineering" in the undergraduate course.			○			
Spacecraft Structure and Material	OKUYAMA Keiichi	2	Spacecraft are required to endure severe environment such as micro-gravity, extreme vacuum, big temperature change, radiation and so on. Development of spacecraft requires broad knowledge of various fields. In this lecture, students will learn in what process spacecraft are designed, developed and operated in the viewpoint of structural dynamics and material mechanics. This Lecture focuses on general concepts applicable to various spacecraft designs but reinforce ideas with real failure examples.	(1) Course introduction (2) Spacecraft environment 1 (3) Spacecraft environment 2 (4) Strength of Materials 1 (5) Strength of Materials 2 (6) Spacecraft structure design philosophy 1 (7) Spacecraft structure design philosophy 2 (8) Outline of Spacecraft structure design, Midterm review (Midterm Exam) (9) Materials 1 (10) Materials 2 (11) Strength and stiffness analysis (12) Approximation of natural frequencies (13) Random vibration response analysis (14) Shock response analysis (15) Temperatures analysis and thermal elastic stress analysis, Final review (Final exam.)	It will be described in the first lecture.	You must read a distributed document before you participate in a lecture. Text book: Spacecraft Structures and Materials, K. Okuyama (to be published in FY2016.) Reference book: Spacecraft Structures, edited by Wijker, J. Jaap, Springer. Reference book: Structural Analysis by O. A. Bauchau and J. I. Craig Wijker, Springer. This lecture is provided in English. It is desirable for students to take the strength of structures (構造力学) or the material Strength (材料力学) in your bachelor's degree course.				○		

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Space Systems Engineering Ⅰ	SHIRAKI Kuniaki	1	We study the space systems engineering referring to spacecraft as an example. It covers the mission analysis and design, system design approach, systems engineering process and methodology, and management needed for space development.	1. Systems Engineering Process 2. Space Mission Geometry 3. Astrodynamics (1of2) 4. Astrodynamics (2of2) 5. Orbit and Constellation Design 6. Spacecraft Design and Sizing 7. Spacecraft Design and Sizing 8. Spacecraft Environment	Homeworks	Furthermore, you are given a problem at the lecture end, must make a report in reference to lecture contents and the distributed document.			○			
Space Systems Engineering Ⅱ	SHIRAKI Kuniaki	1	We study the space systems engineering referring to spacecraft as an example. It covers the mission analysis and design, system design approach, systems engineering process and methodology, and management needed for space development.	1. Space Propulsion Systems 2. Spacecraft Computer Systems and Software 3. Space Payload Design and Sizing 4. Communications Architecture 5. Mission Operations 6. Ground System Design and Sizing 7. Spacecraft Manufacturing and Test 8. Cost Modelling	Homeworks	Download and study the lecture material before each lecture. References 1. Applied Space Systems Engineering, edited by W.J.Larson et al., Space Technology Library. 2. Space Mission Analysis and Design, edited by J.R.Wertz and W.J. Larson. Space Technology Library. 3. Spacecraft Systems Engineering, edited by Peter Fortescue et al., Wiley This lecture is provided in English. It is desirable for students to take "Introduction to Satellite Engineering". It is strongly recommended to take "Space Systems Engineering I" before taking this subject.				○		
Energy Conversion and Plasma Physics	TOYODA Kazuhiro	2	レーザーをはじめとする新たなエネルギー発生源が開発され、エネルギー変換を用いた新たな工学への応用も進んでいる。本講義では、主に電気エネルギーから運動エネルギー（推進力）への変換を行う推進機に着目し、エネルギー変換の応用例を紹介する。	1. 流体力学基礎1 2. 流体力学基礎2 3. 流体力学基礎3 4. 流体力学基礎4 5. 流体力学基礎5 6. プラズマ工学基礎1 7. プラズマ工学基礎2 8. プラズマ工学基礎3 9. プラズマ工学基礎4 10. プラズマ工学基礎5 11. 電気エネルギー変換1 12. 電気エネルギー変換2 13. 電気エネルギー変換3 14. 電気エネルギー変換4 15. 電気エネルギー変換5	出席状況と課題レポートの内容とを総合して評価する。	講義後に参考書などを利用して講義内容の理解を深めておく。また次回の講義内容について調べてから講義に臨むこと。 教科書はなし (1) J. D. Anderson: Modern Compressible Flow. (McGraw-Hill) (2) F. F. Chen: Introduction to Plasma Physics and Controlled Fusion. (PLENUM) (3) 巣木、荒川: 電気推進ロケット入門（東京大学出版会）			○			
Advanced Space Dynamics	HIRAKI Koju	2	物体の3次元空間における基本的な運動の力学について、宇宙機等を具体例として取り上げ、理解を深める。 また、この科目は工学英語科目のため、英語で専門分野について理解を深めることを目的とする。	（1）ケプラー軌道 （2）楕円の性質 （3）ケプラーの法則 （4）ケプラーの方程式 （5）ケプラーの軌道要素 （6）太陽系惑星の軌道計算 （7）地球固定座標への変換 （8）地球の形 （9）国際宇宙ステーションの軌道予測 （10）小惑星探査機はやぶさの偉業 （11）ホーマン軌道変換 （12）惑星への到達軌道 （13）木星スイング・バイ （14）深宇宙ミッションの設計 （15）近未来ミッションの創出	課題に対するレポートの提出、およびプレゼンテーションにより評価を行う。プレゼンテーションは日本語・英語のどちらで行ってよい。	講義では出来る限り数学・物理の知識を補いながら説明しているので、導出過程を自分で再現することが数学・物理の復習につながる。レポート課題は、講義に出てきた内容を組み合わせればできるものなので、復習を大事にすること。 剛体の力学を含めた力学に関する知識、および宇宙工学に関する基本的な知識を有していることが望ましい。			○			
High-speed Gas Dynamics	TSUBOI Nobuyuki	2	ロケットや航空機・宇宙輸送機は過酷な環境下で飛行する．その領域は，低速・亜音速から超音速・極超音速．また連続体から真空環境下まで大きく変化する．このような環境下における流体力学的特性に関して講義を行い，理解を深めることを目的とする． また、この科目は工学英語科目のため、英語で専門分野について理解を深めることを目的とする。	1. 序論 2. 圧縮性流れの基礎理論 3. 極超音速気体力学 （1）極超音速流れとは （2）実験的アプローチ （3）様々な近似解法 （4）非粘性極超音速流れ （5）粘性極超音速流れ （6）実在気体効果 （7）輻射 （8）極超音速流れの風洞試験 4. 希薄気体力学 （1）希薄気体流れとは （2）ミクロに見た気体の性質 （3）気体の平衡状態における特性 （4）固体表面での気体の振る舞い （5）分子流れの数値シミュレーション	出席状況，課題レポートの内容および期末試験の成績を総合して評価する．	各回に指示のある教科書の該当箇所を事前に読んでおくこと．また，授業終了時に示す課題についてレポートを作成し，提出すること． 教科書：講義資料を配布する 参考書： (1)J.D.Andarson, Jr., Hypersonic and High Temperature Gas Dynamics, McGraw-Hill(1989) (2)Bird, G.A., Molecular Gas Dynamics and the Direct Simulation of Gas Flow, Oxford(1994) (3)日本機械学会 編，原子・分子の流れ，共立出版(1996) (4)小林敏夫 編，数値流体力学ハンドブック，丸善(2003) 熱流体力学，なかでも特に圧縮性流体力学の基本的な知識を持っていることが望ましい．			○			
Advanced High Velocity Impact Engineering	AKAHOSHI Yasuhiro	2	The objective of this lecture is to gain the knowledge of the basic theory of high velocity impact such as fan blade off damage on fan case or hypervelocity impact on space structure such as space debris impact on International Space Station. In this lecture stress propagation and mechanism of hypervelocity impact phenomena will be addressed. The course's aim is also to further one's understanding in a specialised field through English.	(1) Introduction of space debris (2) Introduction of low, high, hypervelocity impact (3) Fundamental relationships(1) (4) Fundamental relationships(2) (5) Material response(1:metals and ceramics) (6) Material response(2:composites) (7) Impedance (8) Non-penetrating impacts (9) Strength Effect (10) Tate model (11) HVI: semi-infinite target (12) HVI: finite target (13) Hydrocode (14) Scale Modeling (15) Summary	Grade is evaluated by taking the score of short quiz and presentations into account.	You should read distributed materials before the lecture and investigate some technical works which you cannot understand after the lecture. It is desirable or recommended for the students to take courses related to "Strength of Material", "Solid Mechanics" and so on in the undergraduate course.				○		
Advanced Mechanics of Materials	YAMAGUCHI Eiki	2	精度良い構造解析を行うには，材料挙動（応力ーひずみ関係）が重要である．そのために，弾塑性モデルを学習する．一次元の応力ーひずみ関係における弾塑性モデルの基本事項，ついで多次元の弾塑性モデルとしてミーゼス材料の構成則を学ぶ．特に，ミーゼス材料を取り上げ，具体的に弾塑性モデルを学習する．ミーゼス材料は鋼材の変形挙動を表す標準モデルでもある． この科目は工学英語科目，宇宙工学国際コースのため、英語で実施する。	（1）1次元の材料挙動とモデル化 （2）1次元における弾塑性モデル （3）例題 （4）応力の基本 （5）応力の基本 （6）ひずみの基本 （7）応力ーひずみ関係の基本 （8）多次元の塑性理論 （9）多次元の塑性理論 （10）多次元の塑性理論 （11）応力ーひずみ関係 （12）例題 （13）例題 （14）数値計算法 （15）例題	宿題，期末試験等により総合的に評価する．	講義内容，宿題に疑問点を残さないように心がけること． 参考書： Plasticity for Structural Engineers Wai-Fah Chen and Da-Jian Han J. Ross Publishing				○		

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Advanced Architectural Structure	CHEN Pei-Shan	2	This course will introduce you to the study of nonlinear behavior of structures, including the basic theories on buckling analysis of space frames, analysis of cable structures, and Elasto-Plastic analysis of rigid frames. Furthermore, this course will equip you with the knowledge to anchor your understanding of structural design of space structures, high-rise buildings and mechanical structures. スペースフレーム及びケーブル構造の非線形挙動、ラーメン構造の弾塑性解析理論、空間構造や超高層など多様な構造体の設計に関する基礎知識を修得する。	(1) Introduction, Nonlinear analysis (Part 1): Nonlinear Analysis of a 2-Bar system 履修ガイダンス、非線形解析（その1、単純構造の非線形挙動） (2) Nonlinear analysis (Part 2): Principle of stationary potential energy 非線形解析（その2、ポテンシャルエネルギー停留） (3) Nonlinear analysis (Part 3): Iteration and incremental analysis (Geometric stiffness) 非線形解析（その3、増分解析の概念、幾何剛性） (4) Nonlinear analysis (Part 4): Coordinate transformation and nonlinear element stiffness matrices 非線形解析（その4、座標変換） (5) Nonlinear analysis (Part 5): Nonlinear stiffness matrices by principle of virtual work 非線形解析（その5、仮想仕事の原理による幾何剛性の導入） (6) Nonlinear analysis (Part 6): Incremental analysis and convergence 非線形解析（その6、増分解析と収束計算） (7) Nonlinear analysis (Part 7): Nonlinear buckling analysis and bifurcation of space frames (Imperfections sensitivity) スペースフレームの座屈 (8) Nonlinear analysis (Part 8): Linear buckling 線形座屈 (9) Cable structure (Part 1) : Introduction; Suspension cables (parabolic profile) ケーブル構造（その1、放物線形状のケーブル） (10) Cable structure (Part 2) : Suspension cables (catenary profile), Influence of boundary condition ケーブル構造（その2、懸垂曲線、境界の不整） (11) Cable structure (Part 3) : Prestressing analysis of tensegric structures ケーブル構造（その3、プレストレスの導入、テンセグリティ） (12) Cable structure (Part 4) : Linear and nonlinear analysis of tensegric Structures ケーブル構造（その4、ケーブル構造の非線形・線形解析） (13) Elasto-plastic analysis (Part 1) : Introduction, Homogeneous Beams 弾塑性解析（その1、弾塑性解析基礎、梁の弾塑性挙動） (14) Elasto-plastic analysis (Part 2) : Combined Bending and axial force 弾塑性解析（その2、M-N相関曲線） (15) Elasto-plastic analysis (Part 3) : Elasto-plastic analysis of structures 弾塑性解析（その3、ラーメンの弾塑性解析）	(1) Knowledge of nonlinear analysis of space frames and mechanical structures. 非線形解析の基礎知識を修得する。 (2) Knowledge of analysis of cable structures. ケーブル構造の解析及び設計に関わる知識を修得する。 (3) Elasto-plastic analysis of building and mechanical structures. 構造物の弾塑性解析及び塑性設計に関わる知識を修得する。 The overall grade will be decided based on short reports and the attendance. 出席状況と演習・課題レポートを総合して評価する。	Attendees should prepare to explain and/or solve questions in turn during lectures. 一部分の授業は輪講式で、学習内容の予習・復習を実施すること。 No textbook. Reference books may be introduced during the lecture. 必要な学習資料を配布する。参考図書は講義で紹介する。 It is desirable that the attendees have the basic knowledge of Structural Mechanics. 構造力学Ⅰ・Ⅱ、建築一般構造Ⅰ・Ⅱを修得していることが望ましい。				○		
Heat Transfer	MIYAZAKI Koji	2	宇宙工学国際コースを選択する学生を対象に熱輸送基本三形態（熱伝導・熱伝達・熱放射）を教授する。その上で簡単な数値解析手法を加えた講義を行い、熱輸送現象の理解を深める。	(1) 熱輸送の基本三形態 (2) 定常熱伝導、熱抵抗 (3) 熱伝導方程式，非定常熱伝導 (4) 熱伝導方程式の数値解法 (5) ふく射伝熱の基礎 (6) ふく射伝熱、形態係数 (7) ふく射伝熱、熱抵抗モデル (8) 次元解析，対流熱伝達 (9) 強制対流熱伝達 (10) 自然対流熱伝達 (11) 凝縮熱伝達 (12) 沸騰熱伝達 (13) 熱輸送機器（ヒートパイプ，熱交換器，熱電変換素子） (14) 伝熱工学演習Ⅰ (15) 伝熱工学演習Ⅱ	出席状況と毎回の授業で課すレポート、最終レポートの内容とを総合して評価する。	各回の授業範囲について授業前に調べ、授業後の復習により理解に努めること。 A.F. Mills, Heat Transfer, Prentice Hall J. H. Lienhard, A Heat Transfer Textbook, Prentice Hall 基本的な物理を理解していること，コンピュータープログラム（C言語など）でプログラムを書けることが望ましい。	○					
Space Environment Testing Workshop	CHO Mengu	1	A satellite is exposed to extreme environments such as vacuum, radiation and plasma. It is also exposed to severe vibration and shock onboard a rocket. Satellites have to operate maintenance-free and need to be tested thoroughly before the launch. The purpose of this subject is to learn the actual tests through hands-on laboratory workshop.	1. Vibration – overview 2. Vibration – preparation 3. Vibration test 4. Vibration – analysis 5. Shock – overview 6. Shock – preparation 7. Shock test 8. Shock – analysis 9. Thermal vacuum – overview 10. Thermal vacuum – preparation 11. Thermal vacuum test 12. Thermal vacuum – analysis 13. Thermal cycle overview and preparation 14. Thermal cycle test 15. Thermal cycle – analysis	Report	Download and read the lecture material before each lecture. 参考書: HARRIS' SHOCK AND VIBRATION HANDBOOK, Allan G. Piersol, Thomas L Paez, Macgrawhill, Spacecraft Thermal Control Handbook, David G. Gilmore, Aerospace Press JAXA-JERG-2-130「宇宙機一般試験標準」 SMC-S-016 "TEST REQUIREMENTS FOR LAUNCH, UPPER-STAGE AND SPACE VEHICLES" ISO-15864 " Space systems — General test methods for space craft, subsystems and units" ECSS-ST-10-03 "Space Engineering – Testing" This workshop is for students who register the Space Engineering International Course only. Students are supposed to finish Space Environment Testing.		○				Mandatory for Master program students
Japanese for Beginners	ISHIKAWA Tomoko	1	This course is for international students of the Space Engineering International Course only. The purposes of the course are (1) to get used to Japanese phoneme system, (2) to master basic Japanese sentence patterns and vocabulary, (3) to be able to speak simple Japanese and (4) to master HIRAGANA and KATAKANA	(1) Basic greeting expressions and self introduction (2) Counting system and time-measuring system (3) Sentences using nouns (4) Numeral and Japanese counter words (5) Shopping conversation (6) Sentences to express existence (7) Expressions of dates and periods of time (8) Review (9) Introduction of basic verbs (10) Sentences using verbs (11) Conversation using basic verbs (non-past) (12) Conversation using basic verbs (past) (13) Two types of adjectives and their usage (14) Introduction of "Te-form" (15) Sentences using "Te-form" (16) Review and Test	Class participation, assignments, the final written and oral tests	「Japanese for beginners」 is only for international students of SEIC. Do every assignment and review the lesson. (1)Textbook: Beginner's Japanese for KIT Foreign Students (2)Exercise book: Exercise Book of Beginner's Japanese for KIT Students We will use a romanized Japanese textbook and concentrate on developing the basic hearing and speaking abilities required in daily life.			○			See Note 2, 3
English XA	RUXTON Ian	1	To teach students how to write technical abstracts, and full research papers that meet global standards. Students will bring in content that is related to their thesis, and will learn to build up their academic writing ability. They will learn more technical terminology, and various aspects of how to best structure their	1. course overview, summary and paraphrasing and avoiding plagiarism. Step-by-step introduction to characteristics of a good abstract. 2. Review of summarizing and paraphrasing; introduction to self- and peer-evaluation techniques; Abstract introduction and method. Homework as directed by the instructor: Summary of research. 3. Abstract discussion and conclusion; Designing your poster (1). Turn in your study's summary. 4. Designing your poster (2); Introduction to common errors 5. Presenting your research (1) (practice); Self-evaluation and goal setting; Editing. Poster presentation draft 1; 6. Presenting your research (2); Peer-reviewing (structure, format and language conventions review). 7. Poster presentation; Turn-in poster and final abstract. 8. Poster presentation with peer-editing; Choosing an appropriate topic; Homework as directed by the instructor 9. Writing research introduction; Researching the topic background; Describing aims and writing good research questions; Write a summary about your study's introduction, literature, problem and research questions; Homework as	20% Summary of Student's Study 20% Research Drafts	「English XA」 is for Japanese students only. 1. understand the basic conventions of an abstract 2. understand how to concisely state research objectives, explain the research background, describe the research design and present results 3. understand how to use appropriate register and tone for the specific genre of writing 4. be able to write grammatically accurate sentences using appropriate vocabulary			○	○		See Note 1, 3

Subjects	Lecturer	Credits	Syllabus				Master program				Doctoral program	Note
			Summary / Outline	Topics / Subject of Class / Schedule	Method of Evaluation	Additional Work / Text Book / Notification	1st Semester		2nd Semester			
							1st quarter	2nd quarter	3rd quarter	4th quarter		
English XA	[illegible]	1	academic paper and thesis. IEEE conventions will be introduced. Students will be expected to summarize research, write several abstracts of original research, and present findings through an effective poster. Students will also learn how to critically assess good/bad abstracts and presentations.	directed by the instructor 10. Writing research method; Poster Session writing; Turn in summary of study's introduction. 11. Writing research results; Poster Session writing; Turn in summary of research method. Homework as directed by the instructor 12. Write the discussion and significance of your research results. Designing your poster; How to present results; Poster writing, facts, details and delivery. Turn in summary of research results. Homework as directed by the instructor. 13. Writing research references and citations . Presenting your research (practice), as well as on student self-evaluation, goal setting, along with reviewing the fundamentals of abstract and academic writing. Turn in completed summary; Homework as directed by the instructor. Turn in Poster draft (1). 14. Presenting your research (1); Peer-editing (structure, format and language conventions review). Homework as directed by the instructor. 15. Poster presentations; Peer-editing; Turn-in Final Paper 16. Final Review and student survey	10% Poster Presentation 10% Teacher Discretion 40% Final Research Paper	[illegible] 5. design a visually-appealing and informative poster Active participation is expected in class activities. Students are expected to prepare for class warm-up each week and assist each other Dictionaries will be helpful			[illegible]	[illegible]		See Note 1, 3
Development Project-Design Ⅰ	Teachers in charge of Development Projects	1					(○)		(○)			See Note4, PBL subject / Mandatory for Master program students
Development Project-Design Ⅱ	Teachers in charge of Development Projects	1						(○)		(○)		See Note4, PBL subject / Mandatory for Master program students
Development Project-Fabrication Ⅰ	Teachers in charge of Development Projects	1					(○)		(○)			See Note 4 / Please consult the professor in charge of this class about the time when you should take this.
Development Project-Fabrication Ⅱ	Teachers in charge of Development Projects	1						(○)		(○)		
Development Project-Operation Ⅰ	Teachers in charge of Development Projects	1					(○)		(○)			
Development Project-Operation Ⅱ	Teachers in charge of Development Projects	1						(○)		(○)		
Thesis Research for Degree	Supervisors	2					○					
Special Experiment	Supervisors	2					○					
Practical experience in companies or organizations Ⅰ	Supervisors	1					○					★ See Note 5
Practical experience in companies or organizations Ⅱ	Supervisors	2					○					★ See Note 5
Lectures arranged by external organizations Ⅰ	Supervisors	1					○					★ See Note 5
Lectures arranged by external organizations Ⅱ	Supervisors	2					○					★ See Note 5
Interdisciplinary Seminar of Engineering Ⅰ～Ⅴ	Supervisors	1 each									○	
Interdisciplinary Seminar of Engineering Ⅵ～Ⅷ	Supervisors	1 each									○	Working-students only
Project Research Ⅰ(Specialty-deepening type)	Supervisors	1									○	
Project Research Ⅱ～Ⅳ(Specialty-broadening type)	Supervisors	1 each									○	
Internship (Overseas type)	Supervisors	2									○	
Internship (Company type)	Supervisors	2									○	
Field Research Project	Supervisors	2									○	
Special Studies	Supervisors	2									○	

1. 「English XA」is for Japanese students only.

2. 「Japanese for beginners」is only for international students of SEIC. Depending on student's Japanese level, they may take「Japanese Ⅰ」or「Japanese Ⅱ」instead.

3. Students must take「English XA」(for Japanese students) or「Japanese for beginners」(for international students) during Master program when they enter SEIC as Master's students or during the Doctoral program when they enter SEIC as Doctoral students.

4. Students cannot take several classes of「Development Project (Design・Fabrication・Operation) Ⅰ, Ⅱ」in the same quarter.

5. Students can earn maximum 4 credits from the ★subjects to be counted as the requirements. If you earn additional credits, they cannot be counted as the requirements, but they will be included in your transcript.