TUAT AIMS Programme 2014/15 Department of Electrical and Electronic Engineering

Course Name [科目名]	Communication Electronics
Instructor Name [教員]	Kenta Umebayashi
Office Hours and Contact Information [オフィスアワー、連絡先]	Location: Building 5-405 Telephone: +81-42-388-7483 E-mail: ume_k@cc.tuat.ac.jp If you need my assistance, please give me an e-mail or telephone call.
Course Structure [授業形態]	Lecture and Exercise
Course Credits [単位数]	3
Course Overview [概要]	During the lectures, we focus on novel technologies for communication electronics, which we usually utilize in our daily life, cellular phone, tablet, WiFi and so on. It consists of signal analysis, modulation, multiplexing of time division, frequency division and code division, orthogonal-frequency division, multiple-input and multiple-output division.
Course Key Words [キーワード]	Signal Analysis, Analog Communication, Digital Communication
Academic Goal [目標]	1. able to understand the analog and digital communication. 2. able to develop the communication technologies with the knowledge of CDMA, OFDM, MIMO.
Course Schedule [授業内容]	Week 1: Orientation Introduction to analog and digital communications Week 2: Fundamental of digital communication systems modulation and demodulation of digital signals Week 3: Fundamental concept of signal multiplexing (1) Fundamental concept of signal multiplexing (2) Week 4: mobile communications (1) mobile communications (2) Week 5: Conclusion (1) TEST 1 Week 6: Code division multiple access system (1) Code division multiple access system (2) Week 7: Orthogonal frequency division multiplex (1) Orthogonal frequency division multiplex (2) Week 8: multiple-input and multiple-output (1) multiple-input and multiple-output (2) Week 9: Conclusion (2) TEST 2 Week 10: Final Examination
Textbooks, References, and Supplementary Materials	Handouts and materials given on or before the lectures
Grading Philosophy (Percentage / Criteria / Methodology)	Participation in discussions during the lecture, oral presentation, and final examination or reports.
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	

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Course Name [科目名]	Control System
Instructor Name [教員]	Shinji Wakui
Office Hours and Contact Information [オフィスアワー、連絡先]	Location: Building 3-205 Telephone: +81-42-388-7126 E-mail: wakui@cc.tuat.ac.jp If you need my assistance, please give me an e-mail or telephone call.
Course Structure [授業形態]	Lecture and Exercise
Course Credits [単位数]	3
Course Overview [概要]	This course is intended stimulate curiosity among student on the development and status of automatic control system. Classes will first provide a feedback system, which is the fundamental concept of control system. We will then focus on the key principles of mathematical models of control systems, such as differential equations of dynamic system, Laplace transformation, Block diagrams, and so on. We will also treat several topics regarding control system, such as PID control, frequency response, Bode diagram.
Course Key Words [キーワード]	Automatic Control, Laplace Transform, PID control, Bode Diagram
Academic Goal [目標]	1. able to understand the automatic control system. 2. able to design the automatic control system using feedback concept, as well as to have knowledge of PID control, Bode diagram, and so on.
Course Schedule [授業内容]	Week 1: Orientation Introduction to automatic control systems Week 2: Fundamental of feedback system Several examples of feedback system Week 3: Representation of control system (1) Representation of control system (2) Week 4: Differential equations for dynamic systems Laplace transform Week 5: Block diagram TEST 1 Week 6: PID control Fundamental concept of time response Week 7: Frequency response (1) Frequency response (2) Week 8: Bode diagram and open-loop systems (1) Bode diagram and open-loop systems (2) Week 9: 2-degrees of freedom control system TEST 2 Week 10: Final Examination
Textbooks, References, and Supplementary Materials	Handouts and materials given on or before the lectures

[テキスト、参考書、その他]	
Grading Philosophy (Percentage / Criteria / Methodology) [成績評価の方法]	Participation in discussions during the lecture, oral presentation, and final examination or reports.
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	

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Course Name [科目名]	Microprocessor and Microcontroller
Instructor Name [教員]	Kunihiro Fujiyoshi
Office Hours and Contact Information [オフィスアワー、連絡先]	Location: Building 5-502 Telephone: +81-42-388-7250 E-mail: fujiyosi@cc.tuat.ac.jp If you need my assistance, please give me an e-mail or telephone call.
Course Structure [授業形態]	Lecture and Exercise
Course Credits [単位数]	3
Course Overview [概要]	The aim of this course is to assist understanding of microprocessor and microcontroller, as well as the process steps of these designs. Especially, for layout design, that is the final step of these designs, there are several problems such as module reversal problems, overlap of diffusion region problems, 3-D lattice wiring problems and so on. We will also focus on the general principal of modeling processes and effective algorithmsto solve these problems.
Course Key Words [キーワード]	VLSI, Fabrication and Design, Layout, Graph theory
Academic Goal [目標]	1. able to understand the microprocessor and microcontroller through these fabrication steps, design steps and layout design. 2. able to solve several problems during layout design step, that is the final step of VLSI design.
Course Schedule [授業内容]	Week 1: Orientation Introduction to microprocessor and microcontroller Week 2: Fundamental of VLSI fabrication Fundamental of VLSI design Week 3: Graph theory (1) Graph theory (2) Week 4: Conclusion (1) TEST 1 Week 5: Layout design of VLSI module reversal problems (1) Week 6: module reversal problems (2) Sequence-pair for floor plan (1) Week 7: Sequence-pair for floor plan (2) Sequence-pair for floor plan (3) Week 8: overlap of diffusion region problems 3-D lattice wiring problems Week 9: Conclusion (2) TEST 2 Week 10: Final Examination
Textbooks, References, and Supplementary Materials	Handouts and materials given on or before the lectures

[テキスト、参考書、その他]	
Grading Philosophy (Percentage / Criteria / Methodology) [成績評価の方法]	Participation in discussions during the lecture, oral presentation, and final examination or reports.
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	

TUAT AIMS Programme 2014/15 Department of Electrical and Electronic Engineering

Course Name [科目名]	Numerical Method
Instructor Name [教員]	Toru Uno and Takuji Arima
Office Hours and Contact Information [オフィスアワー、連絡先]	Location: Building 5-402, 403 Telephone: +81-42-388-7145, 7146 E-mail: uno@cc.tuat.ac.jp, t-arima@cc.tuat.ac.jp If you need my assistance, please give me an e-mail or telephone call.
Course Structure [授業形態]	Lecture and Exercise
Course Credits [単位数]	3
Course Overview [概要]	The aim of this course is to understand several techniques to solve problems using numerical method. Classes will first provide an historical perspective of the classic experimental results that lead to our understanding of Maxwell's equations as electromagnetic wave. We will then focus on the key principles of simulation technique.
Course Key Words [キーワード]	Numerical Analysis, Finite Difference method, Finite Element Method
Academic Goal [目標]	1. able to understand the fundamental numerical method to solve ordinary differential equations and partial differential equations. 2. able to utilize several techniques in numerical method such as finite difference method, finite element method, boundary element method and finite-difference time-domain (FDTD) method.
Course Schedule [授業内容]	Week 1: Orientation Introduction to electromagnetic wave and Maxwell's equations Week 2: Fundamental of Numerical Analysis (1) Newton's method Fundamental of Numerical Analysis (2) Lagrange interpolation Week 3: Fundamental of finite difference method Application of finite difference method Week 4: Fundamental of boundary element method Application of boundary element method Week 5: Conclusion (1) TEST 1 Week 6: Fundamental of finite element method Application of finite element method (1) Week 7: Application of finite element method (2) Fundamental of FDTD method Week 8: Application of FDTD method (1) Application of FDTD method (2) Week 9: Conclusion (2) TEST 2 Week 10: Final Examination

Textbooks, References, and Supplementary Materials [テキスト、参考書、その他]	Handouts and materials given on or before the lectures
Grading Philosophy (Percentage / Criteria / Methodology) [成績評価の方法]	Participation in discussions during the lecture, oral presentation, and final examination or reports.
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	

TUAT AIMS Programme 2014/15 Department of Electrical and Electronic Engineering

Course Name [科目名]	Power Electronics and Drives
Instructor Name [教員]	Tomo Ueno
Office Hours and Contact Information [オフィスアワー、連絡先]	Location: Building 5-201 Telephone: +81-42-388-7119 E-mail: tomoueno@cc.tuat.ac.jp If you need my assistance, please give me an e-mail or telephone call.
Course Structure [授業形態]	Lecture and Exercise
Course Credits [単位数]	3
Course Overview [概要]	This course is intended to obtain a wide variety of knowledge on recent semiconductor-based technology. Major topics of this course are, power electronics and devices, semiconductor physics, electronic structures, doped semiconductors, pn junction devices, bipolar transistors, and MOS physics, and so on. We will also focus on other selected topics regarding power electronics, as well as sustainable electric powers.
Course Key Words [キーワード]	Semiconductor Physics, Power Electronics, Power Devices
Academic Goal [目標]	1. able to understand the fundamental semiconductor physics and semiconductor devices 2. able to explain and develop ideas of target power device issue with electrical and electronic knowledge
Course Schedule [授業内容]	Week 1: Orientation Introduction to Power Electronics and Devices Week 2: Fundamental of Semiconductor Physics (1) Fundamental of Semiconductor Physics (2) Week 3: Electronic Structures Intrinsic and Doped Semiconductors Week 4: TEST 1 Applied Voltage and Semiconductor Breakdown Week 5: pn Junction Devices and Physics (1) pn Junction Devices and Physics (2) Week 6: Bipolar Transistors Thyristors Week 7: MOS Physics and MOSFET TEST 2 Week 8: Power Electronics and Devices (1) Power Electronics and Devices (2) Week 9: Sustainable Electric Power (1) Sustainable Electric Power (2) Week 10: Final Examination

Textbooks, References, and Supplementary Materials [テキスト、参考書、その他]	Handouts and materials given on or before the lectures
Grading Philosophy (Percentage / Criteria / Methodology) [成績評価の方法]	Participation in discussions during the lecture, oral presentation, and final examination or reports
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	

TUAT AIMS Programme 2014/15 Department of Electrical and Electronic Engineering

Course Name [科目名]	Electronic Engineering Laboratory
Instructor Name [教員]	
Course Structure [授業形態]	Work in Laboratory
Course Credits [単位数]	2-4 (based on consultation with laboratory staff)
Course Overview [概要]	This course is totally experimental works in the laboratory about electronic engineering field. Under the consultation with laboratory staff, Several themes would be selected by each student. This laboratory works will cover experimental topics on the following courses, i.e. 1) system electronics course 2) electronic and information engineering course
Course Key Words [キーワード]	Laboratory work
Academic Goal [目標]	1. able to obtain the experimental skills for the Electronic Engineering field 2. able to explain and develop ideas of experimental data based on experiences of each student
Course Schedule [授業内容]	Week 1: Orientation and introduction of this course The safety training about electric and electronic engineering Week 2-10 Following experimental themes are scheduled under consultation with laboratory staff 1) Modulation, demodulation and communication electronics 2) Digital communications and error corrections 3) Microcomputer control and A/D, D/A converter 4) Logic circuit design 5) Circuit design using circuit simulator 6) Measurement of optical and electronic characteristics of photodiodes and solar cells 7) Induction motors 8) Pattern recognition? 9) Digital Signal Processing
Textbooks, References, and Supplementary Materials [テキスト、参考書、その他]	Handouts and materials given on or before each theme.
Grading Philosophy (Percentage / Criteria / Methodology) [成績評価の方法]	Participation in the experimental work and reports
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	