TUAT AIMS Programme 2014/2015 – Department of Chemical Engineering

Course Name [科目名]	Separation Process
Instructor Name [教員]	Hideaki Tokuyama, Hiroshi Takiyama
Office Hours and Contact Information [オフィスアワー、連絡先]	Office hours: appointments by e-mail Location: 1-215, e-mail: htoku@cc.tuat.ac.jp or Location: BASE-229, e-mail: htakiyam@cc.tuat.ac.jp
Course Structure [授業形態]	Lecture
Course Credits [単位数]	3
Course Overview [概要]	Introduction to unit operations in chemical engineering: evaporation, liquid-liquid separation, liquid vapor separation, liquid-liquid extraction, solid-liquid separation, and leaching.
Course Key Words [キーワード]	Separation design, Equilibrium, Kinetics, Mass balance
Academic Goal [目標]	1. able to understand equilibrium, kinetics and mass balance. 2. able to design the separation process.
Course Schedule [授業内容]	1. Guidance 2. Diffusion 3. Gas absorption, Part I 4. Gas absorption, Part II 5. Gas absorption, Part III 6. Distillation, Part I 7. Distillation, Part II 8. Examination I 9. Thermodynamics for separation process, 10. Application of thermodynamics 11. Multiphase equilibrium, Part I 12. Multiphase equilibrium, Part II 13. Fundamentals of solid-liquid separation 14. Application of solid-liquid separation 15. Examination II
Textbooks, References, and Supplementary Materials [テキスト、参考書、その他]	J. D. Seader, Ernest J. Henley, D. Keith Roper, Separation Process Principles, 3rd Edition, Wiley (2011). Handouts and materials given on or before the lectures.
Grading Philosophy (Percentage / Criteria / Methodology) [成績評価の方法]	Examinations
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	

TUAT AIMS Programme 2014/2015 – Department of Chemical Engineering

Course Name [科目名]	Environmental Engineering
Instructor Name [教員]	Masaaki Hosomi, Akihiko Terada
Office Hours and Contact Information [オフィスアワー、連絡先]	Office hours: appointments by e-mail Location: 4-320, e-mail: akte@cc.tuat.ac.jp
Course Structure [授業形態]	Lecture
Course Credits [単位数]	3
Course Overview [概要]	This courses introduces the essences and principles of environmental engineering and sustainability. Throughout the course, students will learn diversified environmental problems and countermeasures, e.g., water/wastewater technologies, concept of recycling-oriented society, risk assessment and sustainability.
Course Key Words [キーワード]	Environmental pollution, water, wastewater, sustainability, risk
Academic Goal [目標]	1. able to understand diversified environmental problems 2. able to appreciate principles of countermeasures for environmental pollution. 3. able to understand the significance of holistic approach for recycling-oriented society and environmental sustainability.
Course Schedule [授業内容]	1. Guidance -Environmental problem and environmental engineering- 2. Introduction of water/wastewater engineering 3. Physicochemical wastewater treatment 4. Biological water/wastewater treatment 1 5. Biological wastewater treatment 2 6. Wetland 7. Water reclamation and desalination 8. Examination I 9. Air pollution 10. Concept of recycling-oriented society 11. Risk assessment 1 12. Risk assessment 2 13. Environmental sustainability 1 14. Environmental sustainability 2 15. Examination II
Textbooks, References, and Supplementary Materials [テキスト、参考書、その他]	1.Tchobanoglous, G., Burton, F. L. and Stensel, H. D. (2002) Wastewater Engineering. Treatment and Reuse, 4 ed. McGraw-Hill Publishing Co, New York NY. Handouts will be given at a lecture.
Grading Philosophy (Percentage / Criteria / Methodology) [成績評価の方法]	Periodical reports and examinations
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	

TUAT AIMS Programme 2014/2015 – Department of Chemical Engineering

Course Name [科目名]	Chemical Reaction Engineering
Instructor Name [教員]	Yuichiro Nagatsu, Eika Qian, Hirohide Kamiya
Office Hours and Contact Information [オフィスアワー、連絡先]	Office hours: appointments by e-mail Location: 4-317, e-mail: nagatsu@cc.tuat.ac.jp
Course Structure [授業形態]	Lecture
Course Credits [単位数]	3
Course Overview [概要]	This course ~~provides~~ teaches students how to treat Kinetics of homogenous reaction, Reactor design, Temperature and pressure effects, and Solid Catalyzed reactions.
Course Key Words [キーワード]	Reaction design, Kinetics, Solid Catalyzed reactions
Academic Goal [目標]	1.able to understand how to operate homogeneous reactions in ideal reactors 2.able to understand how to operate reactions catalyzed by solids
Course Schedule [授業内容]	1. Overview of chemical reaction engineering 2. Kinetics of Homogeneous reactions 3. Interpretation of batch reactor data 4. Introduction to reaction design 5. Ideal reactors of a single reaction 6. Design for single reactions 7. Design for parallel reactions 8. Examination I 9. Potpourri of multiple reactions 10. Temperature and pressure effects 11. Choosing the right kind of reactor 12. Heterogeneous reactions – Introduction 13. Solid catalyzed reactions I 14. Solid catalyzed reactions II 15. Examination II
Textbooks, References, and Supplementary Materials [テキスト、参考書、その他]	O. Levenspiel, Chemical Reaction Engineering 3rd Edition, John Wiley & Sons (1999). Handouts and materials given on or before the lectures.
Grading Philosophy (Percentage / Criteria / Methodology) [成績評価の方法]	Examinations
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	

TUAT AIMS Programme 2014/2015 – Department of Chemical Engineering

Course Name [科目名]	Chemical Engineering Laboratory
Instructor Name [教員]	Akihiko Terada, Shohei Riya, Shoji Kudo
Office Hours and Contact Information [オフィスアワー、連絡先]	Office hours: appointments by e-mail Location: 4-320, e-mail: akte@cc.tuat.ac.jp
Course Structure [授業形態]	Laboratory work
Course Credits [単位数]	3
Course Overview [概要]	This laboratory course will provide the opportunity for students to train basic methodologies and skills regarding quantification of environmental pollution and to demonstrate measurements of environmental samples.
Course Key Words [キーワード]	BOD, COD, Biokinetic parameter, coagulation, sedimentation, pH, DO
Academic Goal [目標]	1. able to set up experimental design to quantify the degree of water pollution 2. able to appreciate solid-liquid separation based on gravity 3. able to analyze experimental data based on mass balance and reaction kinetics 4. able to estimate biokinetic parameters by respirometry 5. able to learn state-of-the-art technologies to detect/quantify functional genes
Course Schedule [授業内容]	1. Guidance 2-5. Measurement of dissolved and solid constituents- BOD, COD, MLSS, etc... 6-9. Biokinetic parameter estimation- Michaelis-Menten kinetics and Monod kinetics 10-13. Molecular techniques- PCR, quantitative PCR and gel electrophoresis 14-15. Quiz
Textbooks, References, and Supplementary Materials [テキスト、参考書、その他]	None
Grading Philosophy (Percentage / Criteria / Methodology) [成績評価の方法]	Experimental reports and quiz
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	

TUAT AIMS Programme 2014/2015 – Department of Chemical Engineering

Course Name [科目名]	Physical Chemistry
Instructor Name [教員]	Makoto Sakurai, Chihiro Fushimi, Susumu Inasawa
Office Hours and Contact Information [オフィスアワー、連絡先]	Office hours: Wednesday 5-6 PM, M. Sarakurai, Building 4-319, sakuraim@cc.tuat.ac.jp C. Fushimi, Building 4-322, cfushimi@cc.tuat.ac.jp S. Inasawa, Building BASE-232, inasawa@cc.tuat.ac.jp
Course Structure [授業形態]	Lecture
Course Credits [単位数]	3
Course Overview [概要]	Introduction to engineering thermodynamics, phase equilibria, basic electrochemistry, kinetics, reaction rate and adsorption.
Course Key Words [キーワード]	thermodynamics, equilibria, Gibbs free energy, rate constant, Arrehenius, rate-determining step
Academic Goal [目標]	1. To understand thermodynamics and equilibria 2. To understand kinetics including reaction rate and mass transfer
Course Schedule [授業内容]	1. Guidance and The First law 2. Energy balance of closed systems 3. Energy balance of control volumes 4. The Second law I: Entropy 5. The Second law II: Cycle 6. Chemical potential, The location of phase boundaries 7. The thermodynamic description of mixtures, Raoult's law, Henry's law 8. The properties of solutions, Activities 9. The response of equilibria to the conditions 10. Equilibrium electrochemistry 11. Molecular collisions 12. Diffusion 13. Chemical reaction 14. Adsorption and surface reaction 15. Examination
Textbooks, References, and Supplementary Materials [テキスト、参考書、その他]	1. Y. A. Cengel and M. A. Boles "Thermodynamics, An Engineering Approach Sixth Edition, McGraw Hill, Singapore, 2007 2. P. Atkins, J. De Paula "Atkins' Physical Chemistry" 9th edition, Oxford, China, 2010
Grading Philosophy (Percentage / Criteria / Methodology) [成績評価の方法]	Examination
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	

TUAT AIMS Programme 2014/2015 – Department of Chemical Engineering

Course Name [科目名]	Optimization in Chemical Processes
Instructor Name [教員]	Yoshiyuki Yamashita, Wuled Lenggoro, Teiji Kitajima
Office Hours and Contact Information [オフィスアワー、連絡先]	Office hours: appointments by e-mail Location: 13-804, e-mail: yama_pse@cc.tuat.ac.jp (Yamashita) Base-224, e-mail: lenggoro@cc.tuat.ac.jp (Lenggoro) 1-108, e-mail: teiji@cc.tuat.ac.jp (Kitajima)
Course Structure [授業形態]	Lecture
Course Credits [単位数]	3
Course Overview [概要]	This course will provide the student with the ability to formulate, solve and interpret meaningful optimization problems in engineering, science and business.
Course Key Words [キーワード]	Optimization, Decision Making, Decision Support
Academic Goal [目標]	1. able to understand and formulate optimization problems. 2. able to solve the optimization problem.
Course Schedule [授業内容]	Introduction to Process Optimization (by Dr. Yamashita) • What optimization is all about • Various types of optimization problems • Procedure for solving optimization problems Formulation of Optimization Problems (by Dr. Lenggoro) • Overview of mathematical modeling • Formulation of optimization problems • Applications of optimization problems Discrete Optimization and Applications (by Dr. Kitajima) • Overview of discrete optimization • Formulation of the problems • Solution of various applications
Textbooks, References, and Supplementary Materials [テキスト、参考書、その他]	Thomas F. Edgar, David M. Himmelblau and Leon S. Lasdon, Optimization of Chemical Processes, 2nd edition, McGraw-Hill (2001). Handouts and materials given on or before the lectures.
Grading Philosophy (Percentage / Criteria / Methodology) [成績評価の方法]	Examinations, Hands-on Exercises, and Reports
Other (i.e. Expectations on Classroom Conduct and Decorum etc.) [その他]	