【서식 1】

2015 Educational Program

Department of Biomaterials science

Classification	Subject number	Subjects	Credit (unit-theory-practice)	Note
Major courses	68986	Polymer Gels	3-3-0	
	71346	Functional Separation Membrane	3-3-0	
	73046	Nano-Bio Engineering	3-3-0	
	68984	Advanced Nano-Biomaterials	3-3-0	
	62888	Thesis Research	3-3-0	
	61371	Advanced toxicology	3-3-0	
	73724	Advanced Biosensor	3-3-0	
	68983	Advanced Biomaterial Engineering	3-3-0	
	68988	Advanced Biomaterial Mechanics	3-3-0	
	62080	Molecular endocrinology	3-3-0	
	71347	Advanced non-clinical technology	3-3-0	
	73041	Advanced Bioactive Materials Application	3-3-0	
	73721	Response Theory of Biomaterials	3-3-0	
	73088	Advanced soft nanomaterials	3-3-0	
	70722	Advanced Water Soluble Polymers	3-3-0	
	71343	Advanced Polymers for Drug Delivery	3-3-0	
	73042	Applicable biochemistry	3-3-0	
	73087	Advanced Membranes for Biomedical applications	3-3-0	
	73722	Applications of Biomedical Engineering Materials	3-3-0	
	71268	Advanced disease model application	3-3-0	
	73079	Advanced Regenerative Medicine	3-3-0	
	73045	Special topics in advanced biomaterials	3-3-0	
	70730	Advanced Surface Modification of Biomaterials	3-3-0	
	70734	Advanced Anti-bacteria finishing	3-3-0	
	66450	Advanced enzymology	3-3-0	
General course	LB73056	Writing & Presentation Of English Thesis	3-3-0	
	LB63481	Research Methodology	3-3-0	

* Mandatory: Research and Bioethics (Pass/Fail)

■ Educational objectives

As a convergence department with a strong curriculum and research activity, department of Biomaterials presents unique opportunity to study material science and bioscience. The department expects students to develop useful medical and/or functional biomaterials.

■ Graduation credits

Department		Major	General course (upto 3 credits)	Thesis Research	Required credits
Department of Biomaterials Science	Master's program	18 credits		6 credits	24 credits
	Doctoral program	27 credits		9 credits	36 credits
	Master&doctoral combined program	48 credits		12 credits	60 credits

■ Educational Curriculum

Polymer Gels

Structure, basic characteristics, and function of polymer-gel will be studied. In addition, application examples of the polymer-gel and its research trend will be lectured

Functional Separation Membrane

The general function of separation membrane and materials and function of membranes that are already used in the bio-field will be studied. Creative and research abilities to develop functional membrane as biomaterials by studying recent research trend about separation membrane will be encouraged.

Nano-Bio Engineering

In this course we will study successful examples solving the critical issues in the bioscience and medicine by using nanotechnologies and have a time to discuss their potential applications. For instance, nanocapsules for a drug delivery, nanoporous membrane for separation of biological materials. and nanofibers mat for a medical patch will be discussed.

Advanced Nano-Biomaterials

Synthesis and modification of nano-size biomaterials (nano-technology of biomaterial) will be instructed and Their physiological properties, characteristics, and applications as medical materials will be lectured.

Thesis Research

Students learn how to collect necessary information and data for thesis according hypothesis and abilities to perform experiment and to write thesis will be trained.

Advanced toxicology

It will be introduced how the biomaterials are absorbed, metabolized, and excreted and how the toxicity of the materials are assessed. In vivo and in vitro experimental methods and analysis to estimate the toxicity of the materials will be lectured

Advanced Biosensor

Types and properties of biosensors will be introduced. Learn how to develop new biosensor by studying structure of biosensor in aspects of medical, safety, toxicological, and chemical issues.

Advanced Biomaterial Engineering

The types and limits of present biomaterials will be studied. The student will be encouraged to develop new biomaterials by studying trend for biomaterials in the fields.

Advanced Biomaterial Mechanics

Through studying characteristics of biomaterials, knowledge to develop new biomaterials that have desirable property will be lectured

Molecular endocrinology

Production, action, and mechanism of endocrine hormones will be lectured through clinical and molecular scope. Steroid hormones will be focused for the action in the human body and their clinical approach.

Advanced non-clinical Technology

A goal of this course is to acquire the advanced knowledge and information about advanced non-clinical technology including the cell culture and analysis method, animal management, administration methods, behavioral analysis, blood analysis, serum analysis, necropsy, histological analysis, of evaluation experiment, in vitro technique, animal experiment, data analysis, statistical analysis and the preparation of manuscript.

Advanced Bioactive Materials Application

A goal of this course is to acquire the advanced knowledge and information about application of advanced bioactive materials including anti-cancer materials, anti-aging materials, anti-arteriosclerosis materials, anti-diabetes materials, anti-obesity materials and nanomaterials. These information and technology will be contributed the development of novel biomaterials and application of patient.

Response Theory of Biomaterials

Lecture for adsorption and response of physiologically active matters in the surface of biomaterials according to the interaction between body and material, and for the *in-vivo* interactions and the response theory of biomaterials such as foreign body response, adaptation, biodegradation mechanism of biomaterials, and the metabolism reaction of their byproducts, and for biomechanics.

Advanced soft nanomaterials

A goal of this course is to acquire the general knowledge and information about soft nanomaterials such as micelles and phase-separated nanomaterials. Especially we will highlight a porous nanomaterial can be used for templates to prepare diverse 0- and 1-dimensional(D) nanomaterials such as nanodots, nanorods, and nanowires.

Advanced Water Soluble Polymer

Develope a firm understanding of the fundamental materials science & engineering priciples underlying synthetic/engineered materials used in biology, biotechnology, and biomedical applications focusing on a subset of problems that can be quantitatively understood. This course aims to provide a comprehensive survey of the many facets of drug delivery and targeting for reseachers, carring out research in this area.

Advanced Polymers for Drug Delivery

Lecture for theory and methodology of drug delivery system, characterization and applications of natural/synthetic polymers in DDS, and the properties of polymeric carriers according to delivery methods and polymeric species.

Applicable biochemistry

Applicable biochemistry in the experimental field will be lectured. To control biochemical response, in vivo and in vitro experimental methods will be discussed

Advanced Membranes for Biomedical applications

This course is designed to acquire an advanced knowledge and information about synthetic membranes for application to biomedicine. The lecture will cover the preparation and characterization methods of several standard membranes and we will specially study applications of synthetic membranes prepared by block copolymers and stimulus-responsive polymers.

Applications of Biomedical Engineering Materials

Lecture for physical properties, physiological characteristics, how biomaterials work, and improvement points in applications of biomaterials (on thrombosis, cardiac & cerebrovascular diseases, tissue regeneration, plastic surgery, dental materials, wound & scald treatments, suture, hemostasis etc)

Advanced disease model application

A goal of this course is to acquire the advanced knowledge and information about application of various disease models including cancer model, diabetes model, obesity model, aging model, arteriosclerosis model, neurodigenerative disorder model and atopic dermatitis model. These information and technology will be provide a basic information for the translation of human chronic disease.

Advanced Regenerative Medicine

A goal of this course is to acquire the advanced knowledge and information about advanced regenerative medicine including soft tissue regeneration, hard tissue regeneration, cardiovascular system regeneration, urogenital system regeneration and neuronal system regeneration cancer model. These information and technology will be contributed the development of medical devices and biosensor.

Special topics in advanced biomaterials

A goal of this course is to acquire the recent developments of organic and inorganic biomaterials used in the medicine and bioscience. Especially porous materials including membrane applied wound healing and regenerative medicine will be discussed as a special topic.

Advanced Surface Modification of Biomaterials

composites, microelectronics devices, and thin film technology. In general, special surface properties such as chemical composition, hydrophilicity, roughness, crystallinity, conductivity, lubricity, and crosslinking density are required for the success of these applications. For these reasons, surface modification techques that can transform these inexpensive materials into valuable finished products have become an important part of the plastics industry.

Advanced Anti-bacteria finishing

The course deals with the antibacteria, antimold and deodorization finishing method for harmful bacteria to the human body, also make it possible to develop into the food sanitation, health care, medicine, fiber, plastic, metal etc.

Advanced Enzymology

Basic concepts, signaling, and functions of enzymes will be lectured in aspects of pharmacology and toxicology, thereby, biomaterial's metabolism, toxicity, and immunological knowledge will be given