Course	Basic and Advanced Sciences of Drug Discovery			Teacher	S. Sasaki, Y. Yamaguchi, K. Ichikawa, Y. Ohba, H. Fujita, M. Yodo, N. Takai, K. Kurokawa, K. Yamada, T. Ishihara, Y. Fujii, A Enomoto		
Type of course	Course	Credits	2 units	Semester・Period	Fall	Compulsory・Elective	optional

Aim of Course

The aim of this course is to understand the basic and advanced sciences of drug discovery today, and explain such characteristics. Toward this aim, students are expected to: (1) comprehend basic terms of drug discovery together with their basic background; and (2) be able to use those knowledges accurately. Students will also choose a topic about the most advanced drug discovery, based on instructor's suggestions, and explain that topic to the class.

Point of view	Attainment target of Course	Evaluation tool・method	Ratio of Evaluation
Interest・Motivation・Attitude	1. To be able to understand drug discovery by giving a presentation. 2. To be able to experiment basic terms of drug discovery accurately.	Discussions Essay	10% 20%
Consideration・Judgement	To be able to do preparations and analyses consistently.	Pre-lecture quiz Review questions	10% 10%
Skill・Expression	Students will be able to discuss lecture's topics.	Assignments Projects	10% 10%
Knowledge・Understanding	To be able to explain the characteristics of drug discovery concisely.	Review questions Essay	10% 20%
Attendance			Required to take exam
Total Score			100%

Evaluation criteria and supplementary explanation of evaluation means or methods

Pre-lecture quizzes to be given to check student understands of the study chapter each week (10%). Review questions will be given to further student's comprehension of studied content (10%). Quizzes will be given to check whether the student is able to explain basic terms of Drug Discovery (10%). Students will be asked to give a group or a single presentation (10%) on a topic concerning Basic and Advanced Sciences of Drug Discovery. An essay will be given to check student's understanding of drug discovery terms, as well as that of drug discovery (60%).

Overview of course

The course is intended to introduce students to cutting-edge pharmaceutical sciences research and to the range of research opportunities available within the Pharmaceutical Science Training Program. Students will choose a topic of her/his interest, and report the importance of Drug Discovery. The official language is English. Each class will consist of a ~90 min presentation.

Textbook ・ Reference book

Textbook：none in particular (related paper as according to lecture)

Reference book：none in particular

Reserved book：none in particular

Out of class learning and expectations for students

1. Follow mass media reports on issues in Drug Discovery. Some of them will be discussed in the class.

2. Participate in the class with the following question in your mind: "What would I want to do if I were in the position of people involved in this occasion?"

#	Topic	Details	Preparation・Review
1	Organic Chemistry and Medicinal Chemistry in Drug Discovery Research #1	a. Aim, objectives and schedule of this course b. Organic chemistry and medicinal chemistry play central roles in drug discovery research. We will discuss about some research projects from the chemistry view point. (Y. Yamaguchi)	(Preparation) Read syllabus before attending the class (Review) An outline for lecture presentation
2	Nucleic Acid Therapeutics as New Medicine	Genome science and nucleic acid chemistry form the basis of nucleic acid therapeutics. Taking up several examples, we will discuss genomics from the perspective of diseases and learn the mechanism of action of nucleic acid therapeutics. (S. Sasaki)	(Preparation) Read references (Review) Review questions
3	Redox regulation in diseases #1	Reaction and transfer of electrons play an important role in physiology and onset and propagation of lifestyle diseases. In the talk, principle of redox measurements and abnormal redox regulations in disease models will be discussed. (A Enomoto)	(Preparation) Read references (Review) Review questions
4	Redox regulation in diseases #2	Reaction and transfer of electrons play an important role in physiology and onset and propagation of lifestyle diseases. In the talk, principle of redox measurements and abnormal redox regulations in disease models will be discussed. (K. Ichikawa)	(Preparation) Read references (Review) Review questions
5	Redox regulation in diseases #3	Reaction and transfer of electrons play an important role in physiology and onset and propagation of lifestyle diseases. In the talk, principle of redox measurements and abnormal redox regulations in disease models will be discussed. (K. Ichikawa)	(Preparation) Read references (Review) Review questions
6	membrane traffic, proteolysis, vesicle transport, ubiquitin lysosome	Lysosomal degradation of membrane proteins plays pivotal roles in human health and disease. The molecular mechanism of membrane traffic to lysosomes will be discussed. （H. Fujita）	(Preparation) Read references (Review) Review questions
7	Melanogenesis, melanosomes	Tyrosinase is a key enzyme for the melanogenesis. The molecular mechanism of melanogenesis inhibitors targeting tyrosinase will be discussed. （H. Fujita）	(Preparation) Read references (Review) Review questions
8	Carbohydrate and receptor #1	To Learn the drug mechanism the concept of “ligand-receptor” interaction is necessary. In the lecture, some examples of disease and drug related on ligand- receptor will be introduce. (Y. Fujii)	(Preparation) Read references (Review) Review questions
9	Recent advances in mass spectrometry-based metabolomics platform.	The methodology of comprehensive metabolomics analysis by using LC-MS/MS, which uncovers the global landscape of metabolism in the cells, will be discussed. (T. Ishihara)	(Preparation) Read references (Review) Review questions
10	Analytical techniques for drug discovery	Recent advances in modern analytical techniques for drug discovery. Key words: high-throughput screening, LC-MS. LC-MS/MS, CE-MS, Lab-on-a-chip (Y. Ohba)	(Preparation) Read references (Review) Review questions
11	Structure-Based Drug Design	Lead discovery and lead optimization based on protein structures. (M. Yodo)	(Preparation) Read references (Review) Review questions
12	The development of radioprotective agents	The development of radioprotective agents for gut may contribute to more effective and less harmful heavy-ion therapy. key word: Radiotherapy, PET, SPECT (N. Takai)	(Preparation) Read references (Review) Review questions
13	Bacteriology, Innate Immunity, Molecular Biology	Advanced research on molecular basis of interaction between human host and resident or pathogenic microorganisms will be discussed. (K. Kurokawa)	(Preparation) Read references (Review) Review questions
14	Difference of cell organelles between normal and diseased cells	In some diseases, one or more cell organelles are known to be damaged, resulting in complete loss of their functions. Cell organelles in normal and diseased cells will be discussed. (K. Kurokawa)	(Preparation) Read references (Review) Review questions
15	Molecular Imaging for Biomedical Application	Molecular imaging technique is widely used for the visualization of molecular processes in vivo. We will discuss about the basic chemistry of this technique and the application for life science. (K. Yamada)	(Preparation) Read references (Review) Review questions

Basic and Advanced Sciences of Drug Discovery

The course is intended to introduce students to cutting-edge pharmaceutical sciences research and to the range of research opportunities available within the Pharmaceutical Science Training Program. A series of presentations will focus on drug discovery, cellular signaling mechanisms, mechanisms of drug actions, redox regulation in diseases, radiotherapy, cell & molecular biology, as well as other areas. The class format is flexible and discussion oriented. Each class will consist of a ~70 min presentation and ~20 min group discussion. The official language is English. The discussion may include questions about the research field, specific research presented, or even general questions of relevance to Pharmaceutical Sciences students.