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| Course | Basic and Advanced Sciences of Drug Discovery | | | Teacher | Y. Yamaguchi, K. Ichikawa, Y. Ohba, H. Fujita, M. Yodo, N. Takai, T. Fujiwara, K. Kurokawa, K. Tanaka, 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 |
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| 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. #1 (Y. Yamaguchi) | (Preparation) Read syllabus before attending the class (Review) An outline for lecture presentation |

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| 2 | Organic Chemistry and Medicinal Chemistry in Drug Discovery Research #2 | Organic chemistry and medicinal chemistry play central roles in drug discovery research. We will discuss about some research projects from the chemistry view point. #2 (Y. Yamaguchi) | (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 | Carbohydrate and receptor #2 | Many of molecular target drugs are developed to treat the disease including the cancer. "Post" antibody drug for the treatment and diagnosis will be discuss. (Y. Fujii) | (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. (T. Fujiwara) | (Preparation) Read references (Review) Review questions |
| 15 | Basic Science of Synthetic Organic Chemistry | Carbon - carbon bond forming reaction is the most fundamental and important reaction in organic synthesis. In the talk, the basis of Cross-Coupling reaction and its application will be discussed. key word: Transition metal catalyst, Ligand (K. Tanaka) | (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.