

Course	Basic Toxicology
Course No.	01ER231
Credits	1 Credit
Grade	1 st Year
Timetable	Fall AB Wed 4
Instructor	Yoshito Kumagai, Yasuhiro Shinkai, Masahiro Akiyama, Yumi Abiko
Course Overview	Toxicology is the study of the nature and mechanisms underlying toxic effects exerted by substances on living organisms and other biological systems. Toxicology also deal with quantitative assessment of the adverse effect in relation to the concentration of dosage, duration, and frequency of exposure of the organisms. Along with other sciences, toxicology contributes to the development of safer chemicals used as drugs, food additives, and agricultural chemicals and industrial chemicals. In this course, the students will study 1) the general aspect of toxicology (in particular, chemical toxicology and molecular toxicology), 2) biotransformation of toxicants involved in the detoxification and metabolic activation resulting in dysfunction of macromolecules and cell damage, 3) initial response and cellular protection against toxicants, and 4) toxicological evaluation.
Remarks	Conducted in English. Required for students of International Joint Degree Master's Program in Agro-Biomedical Science in Food and Health.
Course Type	Lectures
Link between Course Objectives and Activities	Toxicology is the study of the nature and mechanisms underlying toxic effects exerted by substances involved in the Foods, Medicine, Environment, etc. The issue is related to food safety. In this study, student will study the general concepts of toxicology based on molecular and clinical evidence.
Academic Goal	<ol style="list-style-type: none"> 1. To be able to explain target organs of toxicants and typical symptoms of poisoning. 2. To be able to explain absorption, distribution, and excretion of toxicants. 3. To be able to explain metabolism and metabolic activation of toxicants. 4. To be able to explain toxicological responses to chemical insult. 5. To be able to explain oxidative stress caused by toxicant exposure. 6. To be able to explain detoxification and treatments of poisoning. 7. To be able to explain molecular basis of cellular defense systems against toxicants. 8. To be able to explain mutagenesis and carcinogenesis caused by toxicant exposure.
Course Schedule	<ol style="list-style-type: none"> 1. Introduction to Toxicology (Yoshito Kumagai) 2. Absorption, Distribution and Excretion of Toxicants(Yoshito Kumagai) 3. Biotransformation of Toxicants: Detoxification-1 (Yoshito Kumagai) 4. Biotransformation of Toxicants: Detoxification-2 (Yoshito Kumagai) 5. Biotransformation of Toxicants: Metabolic Activation(Yasuhiro Shinkai) 6. Oxidative Stress and Toxicants (Yasuhiro Shinkai) 7. Cellular Protection Systems against Toxicants (Masahiro Akiyama) 8. Mutagenesis and Carcinogenesis (Masahiro Akiyama) 9. Target Organs and Toxic Substances (Yumi Abiko) 10. Toxicological Evaluation (Yumi Abiko)
Course Prerequisites and Advisories	
Grading Philosophy (Percentage/ Criteria/ Methodology)	The Students are evaluated by the short test after each lectures (50%) and an end-of-term examination (50%). Grading Criteria is A+ (Superior), A (Excellent), B (Good), C (Average) and D (Failure).
Self-Directed Learning Other Than Coursework	Read textbooks and Basic Toxicology Notes.
Textbooks, References and Supplementary Materials	<p>Lu's Basic Toxicology: Fundamentals, Target Organs, and Risk Assessment, 5th edition, Lu and Kacew ed., Informa Healthcare, NY, 2009</p> <p>Drug Metabolizing Enzymes: cytochrome P450 and Other Enzymes in Drug Discovery and Development, Lee, Obach and Fisher ed., Marcel Dekker Inc., NY, 2003</p> <p>Oxidative Stress in Vertebrates and Invertebrates: Molecular Aspects of Cell Signaling, Farooqni and Farooqui ed., John Wiley & Sons Inc., NJ, 2012</p>

Office Hours	Name: Yoshito Kumagai E-mail: yk-em-tu@md.tsukuba.ac.jp By appointment only
Other (i.e. Expectations on Classroom, Conduct and Decorum etc.)	
Related Courses	Environmental Health Perspective Molecular Nutrition Nutrition, Microbiome and Immunity
Keywords	Health Security, Toxicants, Oxidative Stress, Carcinogenesis