

Course Coding(科目ナンバー)	Year/Semester/Term(年度・学期)	Faculty Offering Course(時間割所属・時間割コード)	Eligible Student Year(開講年次)	Credits(単位数)	Weekday and Period(曜日・時限)
RDM7-007-79-2	2024whole year	Graduate School of Medical Sciences (20080)	1, 2, 3, 4	2	others
Course Title(Theme)(科目名(講義題目))			Instructor(s)(担当教員)		
Developmental and Regenerative Medicine(B7)			NISHINAKAMURA Ryuichi, OKAE Hiroyuki, ISHIGURO Keiichiro, NAKAMURA Akira, OKI Masaya, ERA Takumi, FUKUDA Takaichi, ONO Yusuke, NIWA Hitoshi, NODA Taichi, ESUMI Shigeyuki, Takeo Tooru, OKANO Masaki, KOBAYASHI Akio		
Goals with their ratio(学修成果とその割合)					
1.Advanced expert knowledge, skill and research capability ……50% 2.Profound inter-disciplinary knowledge ……25% 3.Global perspective and ability to take initiative action ……20% 4.Social leadership drive ……5%					
Type of Class(授業の形態)	Lecture				
Teaching Method(授業の方法)	PowerPoint will be used in the lectures, and active participation in the discussion is encouraged.				
Course Goals(授業の目的)	Developmental and regenerative medicine aims at curing diseases by revealing molecular mechanisms of organ development. In this course, you learn basic concepts and techniques used in this filed, including knockout mice, which have now become essential for any area of research. This course serves as introductory for those in the Developmental and Regenerative Researcher Program, and will also be useful for those in other programs, as you obtain essential knowledge on genetic engineering techniques.				
Course Learning goals(学修目標)	【A level (A水準)】 Master basic concepts and techniques used in this filed, and is able to explain the disease mechanisms and treatments based on the knowledge. 【C level (C水準)】 Master basic concepts and techniques used in this filed, and is able to understand the disease mechanisms and treatments.				
Course Outline(授業の概要)	(1) Establishment and application of stem cells including ES and iPS cells; (2) Reproductive engineering including in vitro fertilization, freezing of embryos and sperms, embryo transfer, intracytoplasmic sperm injection, and nuclear transfer; (3) Genome editing technology and knockout mice; (4) Maintenance and differentiation of stem cells; (5) Placental development; (6) Anatomy of each organ in the aspects of ontogeny and phylogeny; (7) Mechanisms of organ and tissue development including the kidney, liver, pancreas, muscle, and gonad; (8) Regenerating organs from stem cells				
Details for Individual Classes(各回の授業内容)					
No.(回)	Date(月日)	Class Theme(授業テーマ)	Brief Outline of Class(内容概略)		
1		Ryuichi Nishinakamura 【eE-0】	Overview & Kidney development		
2		Toru Takeo 【eE-0】	Reproductive engineering		
3		Taichi Noda 【eE-0】	Generation of genetically modified mice and their application		
4		Hitoshi Niwa 【eE-0】	Molecular basis of embryonic stem cells I		
5		Hitoshi Niwa 【eE-0】	Molecular basis of embryonic stem cells II		
6		Takumi Era 【eE-0】	iPS cells, their applications for the medicine		
7		Hiroaki Okae 【eE-0】	Pregnancy in mammals		
8		Masaya Oki 【eE-0】	Bioinformatics in developmental biology		
9		Takaichi Fukuda 【eE-0】	Ontogeny and phylogeny		
10		Shigeyuki Esumi 【eE-0】	Anatomy of digestive tracts and lung		
11		Akio Kobayashi 【eE-0】	Development of the urogenital system		
12		Yusuke Ono 【eE-0】	Muscle development and regeneration		
13		Akira Nakamura 【eE-0】	germ cell formation: preformation and epigenesis		
14		Keiichiro Ishiguro 【eE-0】	germ cell development in mammals		
15		Masaki Okano 【eE-0】	Epigenetics in development		
Estimated out-of-class study time	60 hrs				
Required Textbook(テキスト)					
Reading List(参考文献)	<ul style="list-style-type: none"> <li>・ “Developmental Biology, 12th edition” by Barresi MJF&amp; Gilbert S 2019.</li> <li>・ “Essential Developmental Biology, 4th edition” by Slack JMW &amp; Dale L, Blackwell Publishing 2021</li> <li>・ “Manipulating the Mouse Embryo: A Laboratory Manual, 4th edition” by Nagy A., Gertsenstein M., Vintersten K., Behringer R., Cold Spring Harbor Laboratory Press, 2014.</li> <li>・ “Larsen’s Human Embryology, 5th edition” by Shoenwolf GC, Bleyl SB, Brauer PR, Francis-West PH. Churchill Livingstone, 2014.</li> </ul>				
Enrollment Conditions(履修条件)					
Assessment Methods and Criteria(評価方法・基準)	The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100. Final grades will be based on the average score of the papers and quizzes, as well as the final report and active participation in class discussions.				
Language Used in Instruction(使用言語)	English				

Textbook/Material Language(教科書・資料の言語)	Combination of Japanese and English
Course Based on Practical Work Experience(実務経験を 活かした授業)	Not applicable