

Fundamentals of Molecular Imaging

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09:10~12:10 AM, Thursday

Room 214, 博理館

February 2023

Molecular imaging is the technology that successfully combined molecular biology and clinical medicine, and it will be one of potential fields of medicine in the future. Generally, there are three advantages on molecular imaging research: first, it can transform complicated processes of gene expression and signal transduction into image visually, and that one can realize the possible disease mechanism and features; second, it's able to find early on molecular variations of disease and the process of pathology; last, it can in vivo observe continuously the mechanism and effect on drug or gene therapy. Molecular imaging integrated molecular biochemistry, data processing, nanotechnology and imaging processing, and then it possesses the properties of high specificity, high sensitivity and ultra-high spatial resolution.

Textbook

Markus Rudin (University of Zürich, Switzerland) ,MOLECULAR IMAGING: Basic Principles And Applications In Biomedical Research(2nd Edition)

分子影像：生物醫學研究基本原理與應用(第二版)

and several reference books are recommended in appendix I. First three books in the list are all good choices to keep.

Office Hour

Thursday 02:10-03:00 PM BL Building Rm. 619

Grade

Homework	40%
Midterm Exam	20%
Final project report	20%
Final Exam	20%

Prerequisites (recommended but not required)

Appendix 1 Fundamentals of Molecular Imaging

Feb., 2019

<u>Talk</u>		<u>Date</u>	<u>Topics</u>	<u>Lab/ Homework</u>
01	H	2/23	Fundamentals of Medical Imaging	
02	CY	3/02	Medical Imaging analysis	HW01
03	H, Su	3/09	Introduction to molecular Imaging	HW02
04	H, Su	3/16	MR Fundamentals/ MR Molecular Imaging (1)	HW03
05	H, Su	3/23	MR Molecular Imaging (2)	HW04
06	L	3/30	Fundamentals of Molecular Biology (1)	HW05
07	L	4/06	Fundamentals of Molecular Biology (2)	HW06
08	H	4/13	Midterm Exam	
09	HS	4/20	Molecular Imaging of Probe Design	HW07
10	CY	4/27	The Application of Molecular Imaging-Molecular Imaging of Nuclear Medicine	HW08
11	KB	5/04	Optical Molecular Imaging (1)	HW09
12	KB	5/11	Optical Molecular Imaging (2)	
13	A	5/18	Ultrasonic Molecular Imaging (1)	HW10
14	A	5/25	Ultrasonic Molecular Imaging (2) Photo acoustic Molecular Imaging	HW11
15	H	6/01	Final Exam	
16	H	6/08	Final Report	

Note, H: Prof. Chen, Jyh-Horng; HS: Prof. Hsin, Ling-Wei; Su: Su, Chia-Hao Ph.D;

L: Prof. Liang-Chuan Lai; KB: Prof. Kung-Bin Sung; A: Dr. Liao, Ai-Ho.;

CY: Prof. Chou, Cheng Ying Ph.D.;

Appendix I Reference Books

1. Michel M.J. Modo et al., **Molecular and Cellular MR Imaging**, CRC, 2007.
2. Spencer L. Shorte et al., **Imaging Cellular and Molecular Biological Functions (Principles and Practice)**, Springer; 1st edition, 2007
3. M. Rudin, **Molecular Imaging: principles and applications in biomedical research**, Hackensack, NJ: Imperial College Press, 2005.
4. M. Schwaiger et al, **From morphological imaging to molecular targeting: implications to preclinical development**, Berlin; New York: Springer, 2004.
5. A. A. Bogdanov et al, **Molecular Imaging: An Essential Tool in Preclinical Research, Diagnostic Imaging, and Therapy**, Springer, 2005.