國立清華大學 112 學年第上學期課程大綱

科號 Course No.	LSMC515500	組別 Group		學分 Credit	2	人數限制 Size limit	
修課年級 For grade	■ 大學部　年級以上 (undergraduate) ■ 碩士班一年級以上(含博士班) graduate ■ 碩士班二年級以上(含博士班)						
上課時間 Time	F7F8			教室 Room	521A LSBI		
科目中文名稱 Course title in Chinese	利用線蟲模型研究神經系統疾病特論一						
科目英文名稱 Course title in English	Special topics on *C. elegans* as a model to study neurological disorders Part II						
任課教師 Teacher	王歐力						
擋修科目 Prerequisite				擋修分數 credit			

※下列各欄由任課教師提供※

一、課程說明 Course Description	The model organism *C. elegans* has become increasingly popular for the investigation of neurological diseases. One important factor is the simplicity of the overall design of the nervous system with its comparable high complexity on the molecular level as opposed to mammalian systems. In fact, the number of genes encoding neuronal proteins in *C. elegans* is very close to that found in higher organisms. Even though the nervous system of this nematode worm consists of only 302 cells, this animal displays a large set of complex behaviors such as intricate environmental sensing mechanisms including chemo-, thermo- and mechanosensing, complex locomotion and mating behavior, and habituation and learning processes. The worm has taken those neuroscience research labs by storm working on synapse development and neuronal plasticity as well as on the olfactory system. The latter provides extreme delicate sensing of olfactory cues via dozens of ciliated receptors which are embedded at the "nose" tip of the animal. Complicated intraflagellar transport (IFT) mechanism are close to being unraveled, and understanding IFT and the associated development of primary cilia will gain knowledge on many cilia-based diseases such as polycystic kidney diseases or Bardet-Biedl syndrome. While many of the latter diseases comprise defects in the *cilia transport system* it is also evident that defects in the *axonal transport systems* (ATS) play crucial roles in neurodegenerative disorders. Examples are the pathological accumulation of axonal tau

	protein in Alzheimer's disease or accumulation of axonal neurofilament protein in ALS (amyotrophic lateral sclerosis) all with correlated erroneous transport systems. In this class we discuss current progress on using *C. elegans* as a model to study (a) neurological diseases, (b) the underlying mechanisms of neuronal development and plasticity, (c) how IFT and ATS functions, as well as (d) the molecular structure and function of nematode synapses.
二、指定用書 Text Books	**(1)** "The Neurobiology of C. elegans" by Eric Aamodt; **(2)** "C. elegans Atlas" by Hall and Altun; **(3)** "C. elegans: A Practical Approach" by Ian Hope; **(4)** "C. elegans II" by Riddle et al.
三、參考書籍 References	**(1)** Hammarlund & Jin. Axon regeneration in C. elegans. Curr Opin Neurobiol. 2014 Aug;27:199-207. **(2)** Li & Le. Modeling neurodegenerative diseases in Caenorhabditis elegans.Exp Neurol. 2013 Dec;250:94-103. **(3)** Calahorro & Ruiz-Rubio. Caenorhabditis elegans as an experimental tool for the study of complex neurological diseases: Parkinson's disease, Alzheimer's disease and autism spectrum disorder. Invert Neurosci. 2011 Dec;11(2):73-83. **(4)** Müller et al. Caenorhabditis elegans, a model organism for kidney research: from cilia to mechanosensation and longevity. Curr Opin Nephrol Hypertens. 2011 Jul;20(4):400-8.
四、教學方式 Teaching Method	Introductionary lecture by teacher and assigned student's presentations on current topics to study neurological disorders using *C. elegans* as a model organism.
五、教學進度 Syllabus	2 hourly seminar (whole semester) to discuss current progress on using *C. elegans* as a model to study (a) neurological diseases, (b) the underlying mechanisms of neuronal development and plasticity, (c) how IFT and ATS functions, as well as (d) the molecular structure and function of nematode synapses.
六、成績考核 Evaluation	Class performance: 35%. Assigned presentation: 45%. Attendance: 20%.
七、位址 http://	http://life.nthu.edu.tw/~laboiw/Handouts/Neurobiology_Handout.pdf