沼津工業高等専門学校	開講年度	平成30年度 (2018年度)	授業科目	生体情報工学

科目基礎情報

科目番号	2018-841	科目区分	専門 / 選択
授業形態	授業	単位の種別と単位数	学修単位: 2
開設学科	医療福祉機器開発工学コース	対象学年	専1
開設期	前期	週時間数	2
教科書/教材	Neuroscience -Exploring the Brain- Berar, M. F., et al., Lippincott Williams & Wilkins (2005)		
担当教員	宮下 真信		

到達目標

The purposes of this course are as follows:
(1) Students understand a signaling mechanism of a neuron, input from sense organs to cortical sensory area and output to effectors, and representation of external world information in sensory cortex. (C1-4)
(2) Students propose the application of a medical equipment relating with the human neural system.

ルーブリック

	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
Do you understand a signaling mechanism of a neuron, input from sense organs to cortical sensory area and output to effectors, and representation of external world information in sensory cortex?	You can explain fundamental contents of cerebral nerve system enough. You can report by examining the contents described in the textbook in more detail. (More than 32 points of reports, more than 32 points of final examination)	You can explain fundamental contents of cerebral nerve system to some extent. You can report contents described in the textbook. (24-31 points of reports, final examination 24-31 points)	You cannot explain fundamental contents of cerebral nerve system enough. You cannot report contents described in the textbook. (Under 24 points of reports, under 24 points of final examination)
Can you propose the application of a medical equipment using the mechanism of the human neural system?	You can make the report of the medical equipment research that relates to this course accurately. Or, you can propose the medical equipment of your original idea. More than 17 points of reports)	You can make the report of the medical equipment research that relates to this course to some extent. (12-16 points reports)	You cannot make the report of the medical equipment research that relates to this course. (Under 12 points of reports)

学科の到達目標項目との関係

実践指針 （C1） 実践指針のレベル （C1-4） 【プログラム学習・教育目標 】 C

教育方法等

概要	Recently, artificial limb systems or rehabilitation methods have been developed by using a technology of Brain-Machine interface (BMI). It is indispensable to understand the processing of information on the cranial nerves system for the development of such medical equipment. In this course, we will lecture on a neuron activation mechanism, information processing of cerebrum sensory areas from peripheral nervous system and development of neural systems. In addition, we will explain the onset mechanism of brain waves which is important for brain activity measurement as non-invasive method.
授業の進め方・方法	This course is carried in colloquium form reporting about charge contents of textbook. When presentation content is insufficient or when textbook does not have description, instructor supplements information on it. Student must make an report about a application of medical equipment(s) which is based on the knowledge obtained through this colloquium. Summarized discussion based on their reports will conduct on the last class.
注意点	

授業計画

		週	授業内容	週ごとの到達目標
前期	1stQ	1週	Guidance	Understand positioning and background of "bionics" in medical technology
		2週	Physiology of neuron 1	Understand a neuron and a glia cell, and roles of neurotrophic factor
		3週	Physiology of neuron 2	Understand elementary action of a neuron such as resting potential of a neuron, action potential
		4週	Neural transmission 1	Understand a mechanism of signaling in a synapse
		5週	Neural transmission 2	Understand chemical synapse and neurotransmitter, and agonist/anti-agonist with classification of neurotransmitter in vivo.
		6週	The visual system 1	Understand information processing in retina / peripheral nervous system
		7週	The visual system 2	Understand information processing in visual area of cerebral cortex
		8週	The auditory system	Understand information processing of auditory system (from cochlear/peripheral nervous system to auditory cortex)
	2ndQ	9週	The somatic sensory system	Understand information processing from cutaneous sensor system to somatic sensation of central nervous system
		10週	The motor control and motion output 1	Understand input/output with sense organ – spinal code - muscle
		11週	The motor control and motion output 2	Understand motor control mechanism in motor cortex, and elaboration of behavior order in the basal ganglia
		12週	Brain rhythms	Understand recording method of EEG, and the generation mechanism of EEG
		13週	Synaptic plasticity and development	Understand a synapse learning mechanism of nervous system, neuroplasticity

		14週	Brain and information processing machinery	Understand an application of brain - machine interface technology
		15週	Summary	Discussion of applications about medical equipment
		16週		

モデルコアカリキュラムの学習内容と到達目標

分類	分野	学習内容	学習内容の到達目標	到達レベル	授業週

評価割合

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	合計
総合評価割合	80	20	0	0	0	0	100
Basic Ability	40	0	0	0	0	0	40
Technical Ability	40	0	0	0	0	0	40
Interdisciplinary Ability	0	20	0	0	0	0	20