Department of Neuroscience

NTNU – Trondheim
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EXAMINATION FOR THE COURSE:
NEVR3002 – Systems Neuroscience

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Examination date: 20 December 2011
Examination time: 9 am. – 1 pm.
ECTS-credits: 7.5

Supporting materials: Dictionary
Standardized language dictionaries (e.g. Norwegian-English/English-Norwegian) can be used, but NOT specialty dictionaries such as medical dictionaries. The dictionaries will be inspected by the invigilator before the start of the examination.

Language of examination: English
Number of pages: 3 (including front page).

Examination results will be made available on Studentweb within the end of:
20 January 2012.

Answer one long question (L1 or L2) and 6 short questions (S1-S7).

If you choose L1, answer S1, if you choose L2 answer S2.

S3-S7 should all be answered.

L1:

Describe the cellular and molecular mechanisms for synaptic plasticity in the mammalian hippocampus.

L2:

The motor system of vertebrates comprises a number of interacting brain systems that each contributes to the final outcome: an adaptive and appropriate behavior. Among these systems are the cerebellum and the tectum mesencephali (superior and inferior colliculus). The cerebellum has pathways that descend directly to the spinal cord mediated through brainstem nuclei, or mediated through the mesencephalic red nucleus. The tectum mainly interacts with brainstem nuclei and through those with the spinal cord. Part of these connections that travel to the spinal cord join the medial (anteromedial) descending pathway in the spinal cord and another part travels in the lateral descending pathway.

Describe which connections use which pathway, and how that relates to the organization of the cortico-spinal projections and describe the functional relevance of this organization

S1:

Describe the neuronal pathways that mediate simple ipsilateral segmental spinal cord reflexes. Next add the pathways that are involved to mediate bilateral reflexes

S2:

Define appetitive and aversive learning in *Drosophila* and give an example for each type. Name important neurotransmitters mediating this type of learning.

S3:

What kind of visual information is processed in the cortical regions comprising the ventral and dorsal visual stream?

What is the main function of the oculo-motor reflex?
Which oculo-motor nuclei and eye muscles contribute to this reflex (use drawing).

S4:

Give a brief description how receptor cells (hair cells) are organized in the inner ear (use drawing). Explain how a receptor potential is generated in hair cells.

S5:

A. Explain the basis for the following: Odour information is spatially represented in the primary olfactory centre.

B. Name the main neuron types in the primary olfactory centre, the olfactory bulb of vertebrates and the antennal lobe of insects?

S6

Draw and explain similarities and differences between a taste bud (mammals) and a taste sensillum (insects).

S7

Describe the anatomical organisation of the afferent somatosensory pathways. A restricted unilateral lesion in the spinal cord (medulla spinalis) causes a distinctive clinical picture. Explain why such a lesion causes loss of different sensory modalities on the two sides of the body. What sensory modalities do we expect to see affected distal to the lesion; ipsilaterally (on the same side) and contralaterally (on the opposite side)?