



Faculty of Medicine

Department of Neuroscience

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## Exam NEVR3002

### Sensory Neuroscience

December 20<sup>th</sup> 2010, 9.00 am – 1.00 pm

ECTS credits: 7.5

Number of pages (including front page): 3

Supporting materials: Dictionary

Contact person during examination:  
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**Examination results: January 20<sup>th</sup> 2011**  
Examination results are announced on <http://studweb.ntnu.no>

*Select one of the two alternative options (L1 or L2) for a long answer.*

*Answer 6 of the options (S1-S7) for shorter descriptions; if selecting L1, include S1, if selecting L2, include S2. The long answer counts for 40% of the final grade while the shorter descriptions count 60%.*

*Start each new answer on the top of a new sheet of answer paper.*

L1: nociception and pain:

Describe elaborately the process from activation of nociceptors in the skin to the conscious experience of pain in the cerebral cortex. Write elaborately.

Discuss 1) different stimuli that can activate nociceptors, 2) the structure and function of nociceptors, 3) local factors that can modify the sensitivity of the nociceptors, 4) the anatomical organization of the relevant ascending pathways, 5) cortical structures involved in the sensation of pain, and 6) systems contributing to modify afferent nociceptive signals and the experience of pain in general.

L2: Vision

Describe the transduction mechanism in the rods and how the visual information is processed in the vertebrate retina.

Short answers:

S1 (when selecting L1).

What is the difference between the magnocellular and parvocellular ganglion cells?

S2 (when selecting L2).

Describe briefly the structure and function of the muscle spindle. The adequate stimulus for both primary and secondary sensory nerve fibre terminals in the muscle spindle is stretch of the intrafusal fibres. How can they nevertheless contribute different kinds of information during muscular activity?

S3

What are the principle differences between the insect and the mammalian taste organs?

S4

Give a short characterisation of the olfactory receptor proteins and the signalling pathway in the receptor neurons of the main olfactory system in vertebrates.

The transduction mechanism of olfactory receptor neurons in *Drosophila* has been found to differ from the vertebrate signalling pathway. What is the principle difference?

S5

Describe a model showing how the medial superior olive (MSO) computes the location of sound by interaural time differences.

S6:

Explain the terms habituation and sensitisation, give examples.

S7.

The nucleus ruber is a main output nucleus of the cerebellar system and sends a projection to the spinal cord as well as to the thalamus. Does the rubrospinal tract distribute on the ipsilateral or contralateral spinal cord or on both sides. Provide a short argumentation for your answer.

Describe briefly the functional differences between the anteromedial (ventral) and lateral components of the corticospinal tract.