

**MOL8006**  
**RECEPTOR SIGNALLING AND TRAFFICKING**

**Friday June 8<sup>th</sup> 9.00-13.00**

ECTS credits: 10

Number of pages (included front-page): 2

Supporting materials: None

Contact person during the exam:

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**Exam results: June 29<sup>th</sup> 2012**

Examination results are announced on <http://studweb.ntnu.no/>

Answers can be in Norwegian or English

For each question is given a number of points to indicate how the question contributes to the total of **36 points**. Use these as a guide to estimate how much time it is worth spending on each question.

**Question 1** (4 points)

What is a nuclear receptor? Describe its domain structure and outline its general mechanism of action. Provide three examples of nuclear receptors.

**Question 2** (3 points)

Describe a mechanism that explains how intracellular cAMP levels can be controlled by receptor signalling.

**Question 3** (7 points)

Describe mechanisms that contribute to innate immunity against

- a) Extracellular pathogen-associated molecular patterns (PAMPs)
- b) Cytosolic PAMPs

**Question 4** (5 points)

A (2 p.) Describe how activation of a receptor tyrosine kinase may cause activation of class I PI 3-kinase.

B (3 p.) Describe the mechanism by which class I PI 3-kinase controls cell growth.

**Question 4** (5 points)

Describe how growth factor receptors are downregulated by endocytosis and lysosomal degradation.

**Question 5** (6 points)

A (2 p.) Provide three examples of neurotransmitters and describe the two main types of neurotransmitter receptors.

B (4 p.) Which roles do the following molecules play in synaptic functions?

- a Dynamin
- b Voltage-gated  $\text{Ca}^{2+}$  channels
- c SNARE proteins
- d Synaptotagmin

**Question 7** (6 points)

What is a stem cell? Describe two signalling pathways that contribute to expansion of the stem cell population. Which roles do the proteasomes play in these signalling pathways?