MOL8006
RECEPTOR SIGNALLING AND TRAFFICKING

Friday June 8\textsuperscript{th} 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\textsuperscript{th} 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 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?