

**Exam MOL3014  
Nanomedicine I - Bioanalysis**

**Friday December 3<sup>rd</sup> 2010, 9.00 am - 1.00 pm**

ECTS credits: 7.5  
Number of pages (included front-page): 2

Contact person during the exam:  
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**Exam results: January 3<sup>rd</sup> 2011**  
Examination results are announced on <http://studweb.ntnu.no/>

Do not exceed indicated lengths of answers, drawings not included, font size considered

**Question 1)** (10pts, 1 page)

What is FRET in fluorescence microscopy? What can FRET be used for in molecular biology?

**Question 2)** (15pts, 2 pages)

Atomic Force Microscopy is a useful technique for probing molecular interactions

- a) How does an AFM work? Draw a sketch.
- b) You want to look at distribution of a protein localized on the surface of a microbial cell. How would you do that with an AFM with a gold-coated tip?

**Question 3)** Microfabrication (20 pts, 2 pages)

- a) What is hydrodynamic focusing in a microfluidic device, what does the design look like and what can it be used for?
- b) What is microcontact printing? Outline the process of fabricating a microcontact printing stamp in PDMS.

**Question 4)** (10pts, 1 page)

What problems are associated with attaching proteins to a surface, particularly in the nanoscale?

**Question 5)** (20pts 2 pages)

You are approached by an immunologist who needs help to design a device to study cell-cell interactions at single cell-pair level for experiments lasting a few hours. Use your skills learned in this course and your imagination to help the immunologist design a cell-pairing device.