

# *FY2302: Biophysics 1*

## Syllabus for Autumn 2012

### **Course Teacher**

Professor K. Razi Naqvi (email: [razi.naqvi@ntnu.no](mailto:razi.naqvi@ntnu.no)). Office: Realfagbygget, D4-168. Those who wish to contact me outside the teaching hours should send me an email to make an appointment.

### **Prerequisites**

One year of *calculus-based* physics instruction at university level.

### **Course contents**

The course provides a general introduction to quantitative aspects of biological processes and the underlying physical principles. Among the key topics covered in the course are the following: transport processes and rates of biochemical/biophysical reactions (including enzyme kinetics), structure and function of biological macromolecules and macromolecular assemblies, bioenergetics, protein synthesis, mechanism of inheritance, some commonly used experimental techniques in biophysics.

### **Course objectives**

A student who has successfully completed the course should be able to

- display a comprehensive understanding of the properties and functions of a living cell and subcellular organelles;
- demonstrate how important concepts like the law of mass action, osmosis, membrane potential and material fluxes can be deduced on the basis of thermodynamics;
- handle the diffusion equation and kinetic rate equations;
- carry out spreadsheet simulations of biological processes;
- proceed to a more advanced course in biophysics.

## Lectures/Exercises

We will follow the published time table (reproduced in Table 1), and start, accordingly, on Tuesday, 21 August.

## Textbook

The course will use the following textbook: Thomas N. Nordlund, *Quantitative Understanding of Biosystems: An Introduction to Biophysics* (CRC Press, Boca Raton, 2011).

## Principal tasks and activities

There will be three homework assignments during the semester; each assignment will be given on a Thursday at the end of the teaching session, and is to be handed in (via email) before 6 pm on the following Monday. Later submissions will not be accepted. Model answers to the homework exercises will be given on the following Tuesday.

Three quizzes will be held during the lecture periods. Each quiz will cover the material from the preceding 2–3 lectures, and 30 minutes will be allowed for answering the quiz. The week during which a quiz is to be presented will be known beforehand (Table 2), but the actual day will not be announced. There will be one mid-term examination; it will be held on Wednesday 19 September during the hours and in the room shown in Table 1.

Each student will attend a laboratory session (lasting four hours) and write a report based on the analysis and interpretation of the data collected in the laboratory.

Table 1: Teaching Schedule

Day	Activity	Time	Room
Tue	Exercises	14:15–15:00	R4
Wed	Lectures	08:15–10:00	R41
Thu	Lectures	14:15–16:00	R21

Table 2: Schedule for various tasks

Week	Day	Date	Activity
37	Tue	11 Sep	Homework
38	?	?	Quiz
40	Wed	19 Sep	Mid-term
41	Tue	09 Oct	Homework
42	?	?	Quiz
43			Lab
44	Tue	30 Oct	Homework
45	?	?	Quiz
50	Tue	11 Dec	Final Exam

*Should you miss an obligatory activity (quiz, laboratory, mid-term) on account of illness or some emergency, a new session will be scheduled as soon as possible—provided that you are able to adduce the necessary documentation (medical certificate, etc.)*

## Grading

The relative weight of each activity to the total score is shown in Table 3.

Table 3: Grading policy

Activity	Contribution to Final Score
Quizzes <sup>†</sup> (2 out of 3)	10%
Homework assignments	20%
Laboratory report	10%
Mid-term examination	20%
Final examination	40%

<sup>†</sup>The lowest of the three quiz scores will be discounted.

## Academic integrity

Since working with friends can be very helpful in learning a difficult subject like physics, you are encouraged to find other classmates with whom to study. You should communicate with your fellow students and help one another in solving the problems and grasping the underlying concepts; you will learn more, if you work on the assignments in groups and explain the methods and various approaches to each other. However, there is a clear distinction between discussing the solution to a problem and merely copying someone else's work, and the final work you turn in must be your own.