



**GÖTEBORGS UNIVERSITET**  
**SAHLGRENSKA AKADEMIN**

**BCG820, Molecular genetics and the development of  
recombinant protein biopharmaceuticals**

**7.5 higher education credits**

*Second Cycle*

*BCG820, Molekylär genetik och utveckling av  
rekombinanta proteinläkemedel*

*7.5 högskolepoäng*

*Avancerad nivå*

**26/4 - 2/6 2024**

Course co-ordinator: Elisabeth Thomsson, PhD

Course administration: Course administration at the department of Medical Chemistry and Cell biology is most easily accessed via [farid.yousefi@gu.se](mailto:farid.yousefi@gu.se)

## COURSE GUIDE

### Contents

*This course consists of lectures and both computer and regular laboratory sessions. During the laboratory sessions, students will learn about different advanced molecular genetic methods to study DNA and proteins in cells and tissues. The students will learn how to construct, modify and analyze plasmids for expression of recombinant proteins. The students will learn how to handle and grow mammalian cells in lab-scale and get acquainted with ways to grow cells on a larger scale. The course is aimed primarily at methodological education in modern molecular genetic methods. In the lectures, a variety of methods and their usefulness for answering different research questions and for the production of recombinant protein drugs, are presented.*

The course consists of lectures and several compulsory laboratory sessions (lab 1-3 and two computer labs). Please note that the lab introduction are also compulsory. The computer labs and other assignments in relation to the different lectures will be presented by the respective teachers.

### Course literature

The course has no specifically assigned course book. Textbooks from earlier courses are supposed to be relevant for background reading, among these are:

Alberts et al., Molecular Biology of the Cell (2015; 6th ed) Garland Science  
Berg, Tymoczko, Stryer - Biochemistry, (2015, 8th ed or 2019, 9<sup>th</sup> edition.) Freeman

### Other recommended books

Butler (2004) Animal Cell Culture and Technology, 2nd Ed., Taylor and Francis  
Brown (2020) Gene Cloning and DNA Analysis, 8th Ed, Blackwell Science

As well as scientific articles, lectures, compendiums and other distributed material.

### CANVAS

The course has a CANVAS page where course information, lecture handouts, lab instructions and other literature for the course will be published continuously. Relevant materials for each course week and day is accessible in "Modules" (and in Files). Lab reports will also be handed in by the students via CANVAS (Uppgifter).

### Schedule

The schedule for the course will be available in TimeEdit via Canvas. Any changes to the schedule during the course will be announced as "Anslag" in Canvas, so please make sure to check this site regularly. Lectures are shown in black and obligatory occasions for labs are shown in green in the schedule.

### Forms for assessment

The course is examined through three written laboratory reports (Lab 1, Lab 2 and Lab 3) and a written exam that will be performed in DISA. Two computer labs in genomics also have to be completed to pass the course (see below).

### Grades

The final grade is based on the performance of the written laboratory reports and the exam, in equal parts. The grade scale includes the grades Fail (U), Pass (G) and High Pass (VG). For a passing grade, the minimum grade G ( $\geq 60\%$ ) is required both the exam and each individual lab report. To qualify for VG for the entire course, VG ( $\geq 80\%$ ) is required for both the exam and the combined (summarized) result of the laboratory reports. In addition, VG requires that the laboratory reports have been submitted at the first submission date (2024-06-02) as described below.

## Compulsory computer labs in genomics

**On the 29<sup>th</sup> of April** there will be a compulsory computer exercise related to Anna Rohlins lectures. You need to present at site and are expected to solve a task that will be published on the Canvas site. You should follow the written instructions and solve the task. Anna Rohlin is responsible for this computer lab and she will give more information.

**On the 3<sup>rd</sup> of May** there will be a second compulsory computer lab related to Anna Staffas lecture. You need to be present at site and is expected to perform the different exercises at site to pass. Anna Staffas is responsible for this computer lab and she will give more information.

## Compulsory laboratory work

The course includes the following mandatory laboratory exercises, totaling 36 lab points. The lab assignments will be performed in lab groups of two students. The laboratory exercises are:

1. **In vitro mutagenesis and sequencing (15p) (G≥9p)**  
**Main assistant: Mikael Andersson**  
 PCR mutagenesis  
 Transformation  
 DNA plasmid miniprep
2. **Cell culture and transfection (15p) (G≥9p)**  
**Main assistant: Elisabeth Thomsson**  
 Basic sterile techniques and cell culture  
 Counting of cells  
 Transfection of cells with plasmid  
 Analysis of overexpressed proteins with Western blot
3. **Recombinant Antibodies (6p) (G≥3.5p)**  
**Main assistant: Elisabeth Thomsson**  
 Generation of stable CHO cell clones expressing recombinant IgG  
 Culture of CHO cells expressing recombinant IgG  
 Determination of IgG Concentrations with ELISA

## Laboratory reports

Laboratory reports for the laboratory exercises (lab 1-3) must be written individually. The reports will be scored. Maximum score and score for pass is indicated above. A compulsory lecture on scientific writing is planned on the first course day. The assistant for each lab will also give instructions about the format of the report for each specific lab. The reports must be written in English.

All laboratory reports are submitted as assignments (Uppgift) via the course's Canvas site. The reports will be controlled for plagiarism via Urkund and must therefore be in the format .doc, .docx or .pdf. **All reports must be submitted by 2024-06-04 at 23.59 to belong to the first submission.** This submission is anonymous. The reports will be scored and you will get the corrected report in return with comments. A second submission of corrected or previously non-submitted or unapproved reports shall be made by **2024-08-09 at 23.59**. This is an opportunity to adjust an unapproved report to be approved, or to raise the score on one or more reports to enable a higher grade. For VG in the laboratory part, 80% of the **total** scores for all lab reports together (the sum of the scores for the three reports) are required.

Lab reports that are only handed in at the second submission will also be scored, but the final grade for the course's laboratory part (and thus the entire course) can then not become VG (see above).

### Examination

A written exam (36p), with questions about contents from lectures and laboratory work, will be held on **Friday 2024-06-02 at 08:00-12:00** via DISA. A second examination opportunity will be offered **2024-08-09 at 08:00-12:00**, also via DISA. DISA is the University of Gothenburg's digital system for written exams. Please see <https://studentportal.gu.se/e-tjanster/skrivasalstentamen/i-skrivsalen> for important information about DISA and what it means for you as a student. Read carefully all information on this page.

An approved exam requires 60% and for VG 80% of the maximum credits.

Registration for both exams must be made through Ladok. You log in and choose the exam you wish to register. You need to register for the exam at the latest two weeks prior to the exam.

### Absence

All laboratory occasions marked in green are mandatory. Disease and any other absence must immediately be notified to the course administration: [farid.yousefi@gu.se](mailto:farid.yousefi@gu.se)

### Course Administration

Course administrators are Farid Yousefi and others at the course secretariat at the Department of Medical Chemistry and Cell Biology.

Email: [farid.yousefi@gu.se](mailto:farid.yousefi@gu.se)

For questions about registration, schedule, exam results or if you want to collect exams or registration and study certificates, please turn to the course administration office.

### Teachers

Teachers can be contacted via Canvas (or else by their email-addresses found below).

A discussion group for each teacher will be available at the Canvas site, where you can ask questions and get answers, which will then also be accessible for other students in the course to see.

Namn		Email
Mikael	Andersson	mikael.andersson.2@gu.se
Nicklas	Bonander	nicklas.bonander@gu.se
Malin	Bäckström	<a href="mailto:malin.backstrom@gu.se">malin.backstrom@gu.se</a>
Jan	Holgersson	jan.holgersson@clinchem.gu.se
Richard	Lymer	richard.lymer@gu.se
Sjoerd	van der Post	sjoerd.van.der.post@medkem.gu.se
Anna	Rohlin	<a href="mailto:anna.rohlin@gu.se">anna.rohlin@gu.se</a>
Anna	Staffas	anna.staffas@gu.se
Elisabeth	Thomsson	elisabeth.thomsson@gu.se
Annika	Thorsell	annika.thorsell@gu.se