



# **PROTEIN CHROMATOGRAPHY - ENGINEERING FUNDAMENTALS AND MEASUREMENT FOR PROCESS DEVELOPMENT AND SCALE-UP**

**29<sup>TH</sup> OF JUNE TO 4<sup>TH</sup> OF JULY 2025, VIENNA, AUSTRIA**

**Held by:** Prof. Alois Jungbauer; Department of Biotechnology and Food Science, BOKU University, Vienna, Austria  
Prof. Giorgio Carta; Department of Chemical Engineering, University of Virginia, Charlottesville, VA, USA

## **Aim**

Chromatography became an indispensable tool in research and development in biotechnology. The method is frequently applied for analytical and preparative separation purposes. Equipment, separation media and auxiliary materials have reached a very advanced level. The course will provide insight in the basic theories on chromatography and the fundamental relationships to understand the function of new media developed for high throughput and high capacity. The course will present the necessary chromatographic theory and give the participants an opportunity to apply the theory to experimental laboratory data.

## **Course description**

The scope of the course is to provide insight in the application of chromatographic theory with special emphasis on mass transfer and dispersion.

The theory will cover the fundamentals, the sorption equilibria, modes of operation, insight in chromatographic media, dynamics of chromatography, effects of dispersion and extra column effects. The experimental part will comprise pulse response experiments, dynamic binding capacity, shallow bed experiments, and linear gradient elutions. The experiments will be carried out with typical conventional porous media exhibiting different transport mechanisms. Participants will be also trained in the pitfalls of peak fitting and evaluation of chromatographic data. Detailed course notes will be provided. At the end of the course a detailed protocol has to be worked out.

## **Who should attend?**

The course is aimed at those already employed in industry who is interested in getting more information out of their chromatographic data as well as PhD-students, Post Docs and those working in research laboratories. The participants will work in groups of 3-4 and should have some practical experience in performing chromatographic experiments. No particular background in chromatographic theory is required but a basic knowledge in separation science is an advantage.

### **Duration and location**

The course will be given from Sunday 29<sup>th</sup> of June to Friday 4<sup>th</sup> of July 2025.

The course will be held at the

Department of Biotechnology and Food Science  
University of Natural Resources and Life Sciences, Vienna  
Muthgasse 18  
A-1190 Vienna, Austria  
Phone: 0043 1 47654 79083, Fax: 0043 1 47654 79009  
E-mail: alois.jungbauer@boku.ac.at

Lunches, a reception on Sunday 29<sup>th</sup> of June and the course dinner on Thursday 3<sup>rd</sup> of July 2025 will be provided. For other meals, a variety of restaurants may be found in Vienna.

### **Accommodation**

Hotel or student hostel accommodation can be arranged at your request addressed to Christine Blank BA (christine.blank@boku.ac.at).

### **Fee and registration**

Please register via the BOKU Weiterbildungsakademie – link on homepage. Participants are limited to 20 people.

#### **The fee is:**

**3,520 Euro in case of registration before 31st of January 2024**  
**3,740 Euro in case of registration after 1st of February 2024**  
**2,200 Euro for PhD students**

The fee includes course materials, laboratory expenses, lunches and coffee breaks, the reception on Sunday 30<sup>th</sup> of June 2024 and the course dinner on Thursday 5<sup>th</sup> of July 2024. The fee does not cover other meals and lodging.

In the event of cancellation **before 15th of May 2025** a full refund will be granted, after this date, a 25% fee charge will be made.

### **Course outline**

The lectures and exercises will be given by Professor Alois Jungbauer, Department of Biotechnology, University of Natural resources and Life Sciences and Professor Giorgio Carta, Department of Chemical Engineering, University of Virginia. Experiments will be performed on ÄKTA Pure. For each chromatography workstation one tutor will be available.

Detailed course notes including simulation programs will be provided. The instructors have

also published a book covering the theory and examples given during the course.

### **Current time schedule**

#### **Sunday, June 29th**

16:30	Registration
17:00	Introduction to the course
17:30	Downstream processing of biotechnological products
19:00	Dinner

#### **Monday, June 30th**

09:00	Introduction to chromatography, definitions, models of operation
11:00	The chromatographic workstation
12:30	Lunch break
13:30	Experiments I (pulse response experiments, fitting of data)
16:30	Categories of chromatographic media

#### **Tuesday, July 1st**

09:00	Evaluation of experiments I
11:00	Sorption equilibrium
12:30	Lunch break
13:30	Determination of binding capacity
14:30	Experiments II (breakthrough curves)

#### **Wednesday, July 2nd**

09:00	Evaluation of experiments II
11:00	Local equilibrium dynamics, ideal chromatography
12:30	Lunch break
13:30	Linear gradient elution
14:30	Experiments III (LGE, peak position and HETP from LGE)

#### **Thursday, July 3rd**

09:00	Evaluation of experiments III
11:00	Effects of dispersion
12:30	Lunch break
13:30	Effects of dispersion and extra column effects
14:30	Experiments IV
19:00	Course dinner

**Friday, July 4th**

09:00

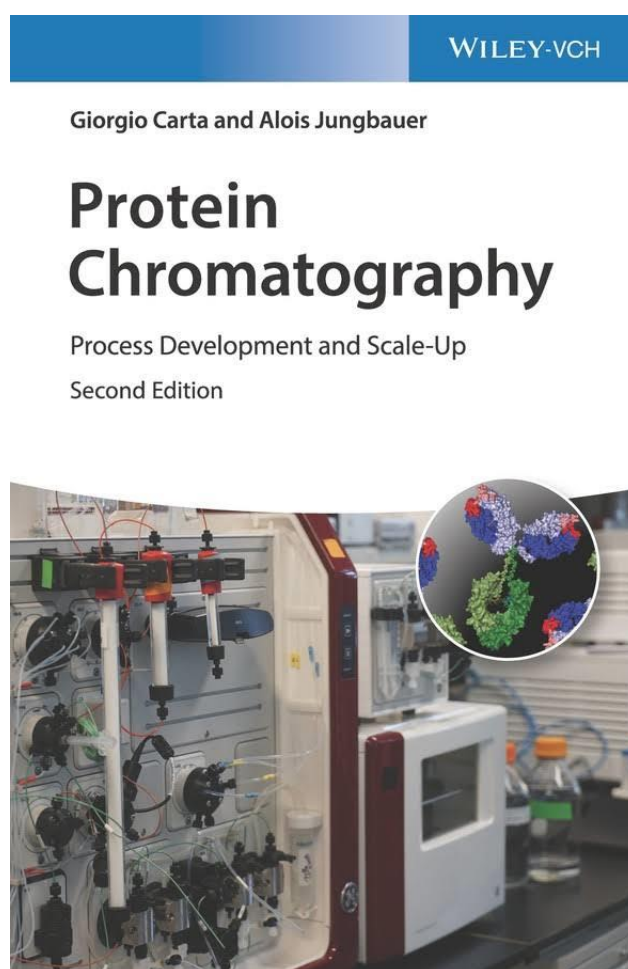
Evaluation of experiments IV

11:00

Summary of course and protocol

Please note: The time table is currently just an overview of the content.

**Book covering the content of the course – Recommended additional literature**



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