



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

**07<sup>TH</sup> TO 12<sup>TH</sup> OF JUNE 2020, VIENNA, AUSTRIA**

**Held by:** Prof. Alois Jungbauer; Department of Biotechnology, University of Natural Resources and Life Sciences 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 7<sup>th</sup> of June to Friday 12<sup>th</sup> of June 2020.

The course will be held at the

Department of Biotechnology  
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 June 7<sup>th</sup> and the course dinner on Thursday June 11<sup>th</sup> 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 Petra Polak BA (petra.polakg@boku.ac.at).

### **Fee and registration**

If you are interested, please fill in and return the attached form. Participants in the course are restricted to 20 people.

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

**3000 Euro in case of payment before March 20<sup>th</sup> 2020**

**3200 Euro in case of payment after March 20<sup>th</sup> 2020**

**1800 Euro for PhD students**

The fee includes course materials, laboratory expenses, lunches and coffee breaks, the reception on Sunday June 7<sup>th</sup> and the course dinner on Thursday June 11<sup>th</sup>. The fee does not cover other meals and lodging.

In the event of cancellation **before May 24<sup>th</sup>** 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 Purifier. 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 7<sup>th</sup>**

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

#### **Monday, June 8<sup>th</sup>**

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, June 9<sup>th</sup>**

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, June 10<sup>th</sup>**

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, June 11<sup>th</sup>**

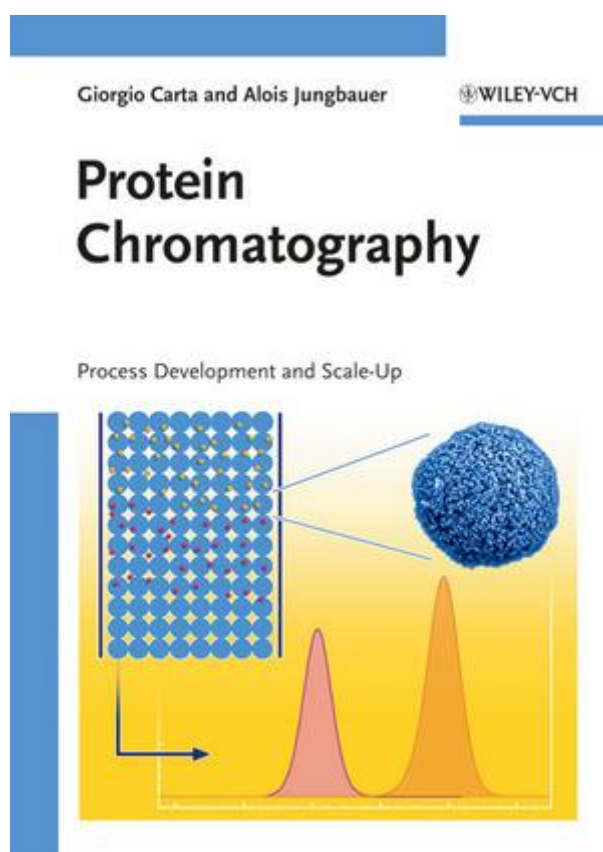
09:00	Evaluation of experiments III
11:00	Effects of dispersion
12:30	Lunch break
13:30	Effects of dispersion and extra column effects
14:30	Experiments IV
19:00	Course dinner

**Friday, June 12<sup>th</sup>**

09:00 Evaluation of experiments IV

11:00 Summary of course and protocol

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



1. Edition - April 2010

99.- Euro

2010. XVIII, 346 Pages, Hardcover

178 Fig. (3 Colored Fig.), 45 Tab.

- Practical Approach Book -

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