

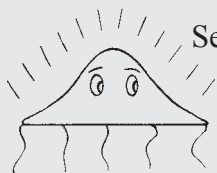
The Center for Research and Education in  
Bioluminescence and Biotechnology  
(CREBB)  
presents:

# BIOCHEMICAL SEPARATIONS

An Introduction to Laboratory Techniques  
in Biotechnology

## **A Three-Day Lecture Course**

[www.rci.rutgers.edu/~crebb/biosep.html](http://www.rci.rutgers.edu/~crebb/biosep.html)

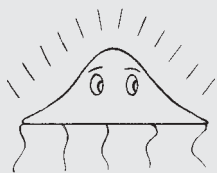


September 19 - 21, 2008  
2009 Dates TBA

# TUTORIALS IN PROTEIN PURIFICATION

3-Day Hands-On Instruction in Downstream  
Processing Techniques

[www.rci.rutgers.edu/~crebb/Tutorials.html](http://www.rci.rutgers.edu/~crebb/Tutorials.html)



June 27 - 29, 2008  
October 10 -12, 2008  
2009 Dates TBA

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THE STATE UNIVERSITY OF NEW JERSEY

# **RUTGERS**

Campus at New Brunswick

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## Faculty Coordinator

*Dr. William W. Ward,  
Associate Professor  
of Biochemistry  
School of Environmental  
and Biological Sciences,  
Rutgers University  
and Director of C.R.E.B.B*



Dr. Ward is a noted teacher and seminar leader with more than 20 years of experience with adult professional audiences. He created "Biochemical Separations" in 1984 and the course has been running continuously ever since. Dr. Ward specializes in the chemical and physical properties of the green-fluorescent protein and other proteins involved in marine bioluminescence. He is published in 112 books, book chapters, journal articles and abstracts. Dr. Ward has co-authored (with Catherine Thomson, Ph.D.) "A Guide to Green-Fluorescent Protein: Applications in Cell Biology and Drug Discovery" for D&MD Publications. This resource-oriented practical guide presents an overview of the most important features and technological applications of Green-Fluorescent Protein (GFP) and its variant forms, and illustrates how GFP is currently being used in the biopharmaceutical industry. He has also authored "Biochemical and Physical Properties of Green-Fluorescent Proteins", a chapter in "Green-Fluorescent Protein: Properties, Applications, and Protocols, 2nd Edition", Chalfie and Kain (eds.), Wiley-Liss, Inc. 2006.

## Biochemical Separations Course Description

This is an introductory-level course designed to acquaint participants with the wide range of modern techniques available for separating and purifying biomolecules. The fundamentals of each technique will be presented, including practical examples; however, sufficient theoretical background will be provided to enable the participants to understand how each technique functions. Emphasis will be placed on techniques used in protein isolation and purification - both from native and recombinant sources. The course will be particularly valuable to those who are beginning work in biochemistry and biotechnology laboratories and who wish to broaden their background in separation procedures used in biochemistry. "Biochemical Separations" may be useful for persons getting back into the laboratory after several years, for those between jobs, and for scientists whose job description now requires familiarity with separation techniques used in Downstream Processing.

After completing this course, participants will be well prepared for the 5 1/2 day laboratory course "Protein Purification: Principles and Practice". **Cours Website:** <http://www.rci.rutgers.edu/~crebb/protein.html>

## The Center for Research and Education in Bioluminescence and Biotechnology (CREBB)

*The Center offers a series of continuing education workshops each year featuring nationally renowned presenters. The Center for Research and Education in Bioluminescence and Biotechnology (CREBB) is a component of Rutgers University, School of Environmental & Biological Sciences (SEBS). The CREBB mission is to perform basic research on bioluminescence and to utilize bioluminescence (especially the Green Fluorescent Protein) as a tool to educate the scientific and industrial communities in the field of biotechnology.*

***Protein Purification:  
Principles and Practice***

(5½ days, laboratory/lecture/discussion)

This, our centerpiece course, has been offered more than 40 times over the past 17 years to a total audience in excess of 1,200. Participants isolate GFP from jellyfish or transformed *E. coli* cells and purify the protein to homogeneity in a series of chromatographic steps including: gel filtration, ion exchange, hydrophobic interaction, and size exclusion HPLC. Subsequent electrophoretic analyses include SDS PAGE, native PAGE, IEF, preparative PAGE and Western blotting. The course concludes with an interactive workshop during which participants work in groups to deduce the structure of the GFP chromopeptide.

**Course Cost: \$2,695**

**June 1 - June 6, 2008**

**July 13 - July 18, 2008**

**July 27 - August 1, 2008**

**January 4 - January 9, 2009**

**March 15 - March 20, 2009**

**Summer 2009 TBA**

(all Courses run Sunday through Friday)

**Course Website:**

**<http://www.rci.rutgers.edu/~crebb/protein.html>**

The tuition fee includes continental breakfasts, lunches, coffee breaks and three dinners, along with all course materials and hand-outs.

Tuition Fees **MUST BE PAID** at least 3 weeks prior to the start of the course to be eligible for the discounted rates.

**Course Outline****Friday - 3 pm to 7 pm****Saturday - 9 am to 5 pm****Sunday - 10 am to 3 pm**

➤ **INTRODUCTION TO THE PROPERTIES OF BIOMOLECULES**

Chemical and physical properties of proteins, nucleic acids, carbohydrates, lipids, and other biomolecules. General strategies for molecular separations will be introduced.

➤ **PREPARATIVE METHODS**

Survey of batch methods (salting out, isoelectric precipitation, and batch adsorption), dialysis, filtration, and ultrafiltration. Selected methods used in enzyme purification will be presented in detail.

➤ **BASICS OF LIQUID CHROMATOGRAPHY OF BIOMOLECULES**

Principles of liquid chromatography. Emphasis will be placed on modern methods of low pressure liquid chromatography including gel filtration chromatography. Elementary chromatographic theory will be introduced.

➤ **ION EXCHANGE AND HYDROPHOBIC INTERACTION CHROMATOGRAPHY**

A survey of ion exchange and hydrophobic (reverse phase) separation methods for proteins, nucleic acids and smaller molecules. Examples will include both high pressure and low pressure methods.

➤ **AFFINITY CHROMATOGRAPHY**

An introduction to this powerful method for purifying enzymes, antibodies, nucleic acids, and polysaccharides. Examples will include immobilized metal ion affinity chromatography, and affinity chromatography of enzymes with immobilized substrate analogues. Separation of recombinant proteins will be emphasized.

➤ **CONTEMPORARY PRACTICE OF LIQUID CHROMATOGRAPHY (HPLC)**

An overview of the basic operating principles of HPLC with a comparison to other available tools. Special emphasis will be placed on the role of modern liquid chromatography as a problem-solving tool for bioanalytical research.

## Separations

### Course Outline

➤ **FUNDAMENTALS OF ELECTROPHORESIS**

Basic principles of electrophoresis and survey of electrophoretic methods. Emphasis will be placed on polyacrylamide gel electrophoresis of proteins, molecular weight estimation by SDS PAGE, and isoelectric focusing.

➤ **SEPARATION TECHNIQUES IN PROTEIN AND DNA SEQUENCING**

Use of HPLC reverse phase chromatography in the sequencing of proteins by automated Edman degradation. Discussion of electrophoresis of nucleic acids as it applies to the sequencing of DNA.



**New for 2008**



## TUTORIALS IN PROTEIN PURIFICATION

(3 days, hands-on instruction in Downstream Processing)

June 27 - 29, 2008 (Fri - Sun)

October 10 - 12, 2008 (Fri - Sun)

2009 Dates TBA

In an intimate, small group laboratory setting, learn the details of protein purification from an expert. Join Professor William Ward as he leads you through the step-by-step purification of a model protein, hands-on from start to finish. Under his constant supervision, you will prepare a crude extract, administer several batch purification steps, and then achieve purity in a series of high resolution chromatography steps. You will then judge purity of the final product in comparison with your crude extract by calculating specific activity and by analyzing your product by size exclusion HPLC and/or SDS gel electrophoresis.

As you assist in setting up equipment, carrying out experiments, and analyzing results, you will have many opportunities to benefit from Professor Ward's extensive experience as a long-time, practicing protein biochemist.

So that your specific questions can be properly addressed in one-on-one dialogue, registration will be limited to just 8 participants.

Course sessions run three days, Friday thru Sunday with lunch provided on Saturday and Sunday as follows:

Friday - 3 pm to 7 pm

Saturday - 9 am to 5 pm

Sunday - 10 am to 3 pm

Course Cost: \$1440.00

## Course Location

The course will be held on the School of Environmental and Biological Sciences Campus, New Brunswick, NJ. A map with written directions to the course site will be included with your confirmation of registration. If you do not receive your confirmation ten days before the course starts, please call our Registration Desk at (732) 932-9763 ext. 225 or 216.

**For information on travel and lodging**, please contact:

Professor William W. Ward at (732) 932-9763 ext. 216

(email: crebb@rci.rutgers.edu), Gloria Kierniesky at ext. 225 (email: kierniesky@aesop.rutgers.edu), or phone the Rutgers Information Service at (732) 932-INFO.

Please visit the following Rutgers web site for information on discounted travel and lodging: <http://www.ruttravel.rutgers.edu/discountprograms.html>

## Refunds

You may withdraw from this course with a full refund (less a \$100 processing fee) provided our office is notified at least five (5) full business days prior to the start of the course. Beyond that time, you may be responsible for the full tuition fee if you register but do not attend. Substitutions are encouraged.

CREBB reserves the right to cancel this course due to insufficient enrollment.

## Registration Information

The tuition for this two day course is \$995. Register three weeks prior to the start of the course and pay only \$895. A discounted fee of \$850 per person is available if two or more registrants from the same company register. The tuition fee includes continental breakfasts, lunches, and coffee breaks along with all course materials and hand-outs. Fees **MUST BE PAID** three (3) weeks prior to the start of the course to be eligible for the discounted rates.

## Ways to Register

### By Phone

9:00 a.m. – 4:00 p.m., Monday – Friday

Registration Desk: (732) 932-9763 ext. 225 or 216

### By Mail

Send check or money order (payable to Rutgers, the State University) to:

**CREBB Registration Desk**

**Rutgers University**

**School of Environmental and Biological Sciences**

**Department of Biochemistry and Microbiology**

**76 Lipman Drive**

**New Brunswick, NJ 08901-8525**

### By Credit Card

Visa or Master Card

Call Registration Desk (732) 932-9763 ext. 225 or 216

### By Fax

(732) 932-3633, 24 hours

Please fax a copy of check or money order with fax registration.

### Via the Internet

Biochemical Separations

<http://www.rci.rutgers.edu/~crebb/RegisterBiosep.htm>

Tutorials in Protein Purification

<http://www.rci.rutgers.edu/~crebb/RegisterTutorials.html>

**Rutgers University**  
**School of Environmental and Biological Sciences**  
**(CREBB)**  
**Department of Biochemistry and Microbiology**  
**76 Lipman Drive**  
**New Brunswick, NJ 08901-8525**

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First Name For Nametag \_\_\_\_\_  
Employer \_\_\_\_\_  
Job Title \_\_\_\_\_  
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E-mail Address \_\_\_\_\_

***Biochemical Separations***

September 19 - 21, 2008

***Tutorials in Protein Purification***

June 27 - 29, 2008

October 10 - 12, 2008

***Tuition Fee:***

**\$1440.00** (Early Registration)

**\$1600.00** (Regular Registration)

**NOTE: Fees MUST BE PAID**  
3 weeks prior to the start of the  
course for all discounted rates.

Check or Money Order  
enclosed in the amount of

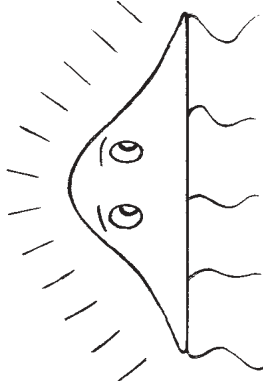
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CREBB, Rutgers University  
School of Environmental and Biological Sciences  
Department of Biochemistry and Microbiology  
76 Lipman Drive  
New Brunswick, NJ 08901-8525



# BIOCHEMICAL SEPARATIONS & TUTORIALS IN PROTEIN PURIFICATION

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