

"This is probably the best training I have ever been to. With the academic setting at the facility and the information that were presented, I can walk away with so much confidence in operating and interpretation of LC/MS and GC/MS."

- Philip P. Ngo
Gilead Sciences, Inc.
San Dimas, CA

"The lab experiments and homework really enable you to apply the knowledge acquired in lecture to real sample analyses. This course gives me a strong foundation to go back and be successful with hands on-on LC/MS and GC/MS analysis in my lab."

- Melissa Morzek-Morrison
Amgen, Inc.
San Dimas, CA

"Relaxed, friendly environment. Questions were encouraged and answered clearly; sometimes fitting this with the relevant section if it didn't fit with the section being talked about. Concise course notes will undoubtedly be valuable resources in the future. Lots of hands-on experiences with very knowledgeable teaching staff and students [TA's]. Large amounts of lecture well spaced with breaks to avoid being overwhelmed with content."

- Clarie E. Brook
Novus International
St Louis, MO

"Lectures were very well presented. The high volume of information was presented in a logical manner. Group Projects and presentations were very useful."

- Mr. Robert Pawlik
Wright Patterson AFB
Ohio



Presents



Chromatography/Mass Spectrometry: Principles & Practice

Featuring the Latest in LC/MS and GC/MS

Now in its 24th Continuous Year

Monday–Friday, August 2–6, 2010

University of the Pacific

Stockton, California

(Just East of San Francisco)

The course combines lecture, laboratory, and problem-solving sessions that use actual MS experimental data which you acquire using the latest instrumentation. You will learn important fundamental operational techniques and will solve common problems that require you to hone your interpretational and experimental skills.

Register Online at

http://www.lcresources.com/training/trchrom_massspec.htm

Learn to Meet the Increasing Challenges You Face on the Job

Chromatographic and mass spectrometric analyses have become increasingly demanding. Chromatographers need to know more about the principles of ion formation and mass spectral fragmentation to identify separated analytes. Mass spectrometrists need to know about analyte separations to obtain a more meaningful mass spectrum that can lead to an unambiguous identification.

You Should Attend this Comprehensive Course if:

- ◆ You work with chromatography and find that your future responsibilities combine chromatographic techniques with mass spectrometry.
- ◆ You work with mass spectrometry and need to learn more about interfacing chromatographic systems to MS..
- ◆ You work with either LC/MS or GC/MS and find your work area expanding into the other technique.
- ◆ You wish to expand your overall analytical technical expertise by learning chromatography/mass spectrometry.

ALSO . . . a general familiarity with organic chemistry nomenclature will be helpful.

Please Be Sure To Bring A Calculator to the Course

You'll Gain a Theoretical and Practical Knowledge of:

- ◆ Operating Principles of LC/MS and GC/MS
- ◆ Strategies for Data Interpretation – EI, CI, MS/MS, and In-Source CAD
- ◆ Ionization Techniques – EI, CI, APCI, APPI, ES, and other techniques
- ◆ Inlet-System Interfacing for LC and GC
- ◆ Quantitation Using GC/MS and LC/MS
- ◆ Instrument Maintenance
- ◆ Experimental Design
- ◆ Use of Computer Tools for Generation of and Dealing with LC/MS, GC/MS, and MS/MS Data
- ◆ Optimization of GC/MS and LC/MS Methods
- ◆ MS Requirements for Hyphenated Techniques
- ◆ The best modern reference materials for the mass spectrometrist
- ◆ AND MUCH MORE!

Here's How the Hands-On Laboratory Sessions Will Increase Your Understanding of GC/MS and LC/MS

◆ **Laboratory Sessions Offer Top-Quality Training and Individual Attention!**

The laboratory sessions will include computer analysis of data that you have acquired using various GC/ and LC/MS systems. Small groups of three or four participants and an expert coach will be given a specific problem and acquire the data necessary to solve the problem. You and your group will then make a presentation on your results and conclusions.

◆ **Experiments and Exercises Provide Valuable Hands-On Experience in GC/MS and LC/MS!**

Laboratory exercises involve data acquired in electron ionization and chemical ionization (EI and CI) for GC/MS and electrospray ionization and atmospheric pressure chemical ionization (ESI and APCI) for LC/MS as well as data acquired in MS/MS. The course deals with chromatographic analytes with a molecular mass to about 1,000 Da. . The laboratory sessions challenge your problem solving skills using data that you acquire on the latest modern instruments supplied to this course by our supporting instrument manufacturers..

Other Key Ways You'll Benefit from Attending this Course

- ◆ Consult with expert instructors about your analytical problems and challenges.
- ◆ Develop a strategy for interpreting mass spectral data.
- ◆ Learn which compounds are amenable to which mass spectral techniques.
- ◆ Learn the operating principles of ionization sources, m/z analyzers, and detectors.
- ◆ Learn the operating principles of sample inlet systems (direct-probe and GC and LC inlets) and associated vacuum systems.
- ◆ Learn how to process data with a data system; appreciate various aspects of tuning and troubleshooting a mass spectrometer.
- ◆ Obtain experience in library searching on benchtop data systems and the use of other computer-aided mass spectral interpretation tools.
- ◆ Use a vast array of the latest in modern GC/MS and LC/MS instrumentation.
- ◆ Become familiar with the complexity and care involved in operating the mass spectrometer with a separation technique.
- ◆ Learn the techniques of accessing literature on mass spectrometry research and applications.

Course Schedule

Check-in will begin in Room 170 CR in the Classroom Building of the University of the Pacific at 7:30 a.m. on Monday, August 2. The course will be taught from 8:00 a.m. to 5:00 p.m. each day. If you have questions regarding the technical content of the course or local transportation arrangements, contact Professor O. David Sparkman at (925) 754-5003 or by e-mail at ods@csi.com.

Sunday: Optional Course Reception in the Lobby of the Stockton Grand Hotel (7:30 p.m.)

Monday: Welcome and Introductions, Overview of the Course
A Practical Example of GC/MS
Atoms and Molecules as They Relate to MS
Terminology
How Ions Are Formed
Isotope Peak Ratios and Elemental Compositions
Data Analysis
Laboratory Session

Tuesday: Participants' Presentation of Laboratory Results and Homework
LC/MS Interfaces
More Data Analysis
Laboratory Session

Wednesday: Participants' Presentation of Lab Experimental Results
CI, MS/MS, High Resolution
Optimization of LC/MS Methods
Quantitation, SIM, and SRM
Laboratory Session

Thursday: Participants' Presentation of Lab Experimental Results
Library Search & Data System Hardware
Resolution/Resolving Power and Accurate Mass Measurements
Laboratory Session
Course Dinner (Evening)

Friday: Participants' Presentation of Lab Experimental Results
GC/MS
Sample Handling & Special Information
Pumps, Probes, and Detectors
Optional Open Laboratory Session and the following Optional Lectures:
Protein Analysis Using Electrospray
How to Purchase an Instrument
The Literature of Mass Spectrometry
Instrument Maintenance

* Detailed lectures on each type of m/z analyzer used in mass spectrometry will be presented at an example of that type of instrument by one of the instructors.



The Comprehensive Course Notebook You Will Receive Is a Vital Reference...

Each registrant will receive a copy of the **Chromatography/Mass Spectrometry: Principles and Practice (C/MSP&P)** course notebook. Sure to become a vital reference in your use of GC/ and LC/MS work and your MS library, this notebook is a definitive source of information on MS techniques, interpretation, and instrumentation. The **C/MSP&P** notebook is available only to the attendees of this LC Resources course and cannot be purchased separately.

About the Instructors

O. David Sparkman is an Adjunct Professor of Chemistry at the University of the Pacific; Manager of the Pacific Mass Spectrometry Facility; author of *Mass Spectrometry Desk Reference*; coauthor, along with J Throck Watson, of *Introduction to Mass Spectrometry: Instrumentation, Applications, and Strategies for Interpretation*; a consultant to the National Institute of Standards and Technology (U.S. Department of Commerce) Mass Spectrometry Data Center; and the 2008 recipient of the American Chemical Society's Analytical Chemistry Division's *Award for Distinguished Service in the Advancement of Analytical Chemistry*. Professor Sparkman has extensive experience in various aspects of mass spectrometry, GC/MS, LC/MS and DART mass spectrometry. He has helped to develop a number of different mass spectrometry data systems and is currently working with NIST on several projects involving mass spectral databases and search algorithms. Along with J. Throck Watson, he developed the original materials used in the GC and GC/MS portion of this course.



Frederick E. Klink, also an Adjunct Professor of Chemistry at the University of the Pacific, completed an undergraduate degree in biochemistry and graduate studies in forensic chemistry. He is currently a consultant and trainer in LC, LC/MS, and other scientific instrumentation. Fred has conducted training classes in analytical chemistry since graduate school working for private clients and the American Chemical Society before joining LC Resources. He has contributed to several scientific textbooks including the *Wiley Encyclopedia of Analytical Chemistry*. Fred spent 16 years in the analytical instrument industry working in product development, product management, marketing management, and strategic planning. Fred developed the LC/MS interfacing and optimization materials used in this course as well as the LC/MS experiments.

Patrick R. Jones is a Past Chair of the Chemistry Department of the University of the Pacific. His research includes many aspects of mass spectrometry, and he holds patents in the area of FTICR mass spectrometry. His laboratory is the home to the mass spectrometers in the Mass Spectrometry Facility at Pacific. He also has been involved in the development of qualitative and quantitative techniques and methodology for GC/MS and LC/MS. His lab has made some significant advances in the development of MS instrumentation.

See page 7 for information on other upcoming 2009 courses offered by LC Resources in Mass Spectrometry that will be taught by Professors Sparkman, Klink and other instructors.

Course Site and Housing Information

The lecture and laboratory sessions will be held in the Chemistry Department in the Classroom Building of the University of the Pacific in Stockton, California. A campus map will be sent with your course confirmation letter.

A block of guestrooms will be reserved at the Stockton Grand Hotel, 2323 Grand Canal Boulevard, Stockton, CA (a short ride to the course site) at a special group rate. We urge you to call the hotel as soon as possible at (209) 957-9090 or FAX (209) 473-0739 to reserve a room, and be sure to mention that you are part of the LC Resources Short Course group. The hotel web site is <http://stockton-grand-hotel.pacificahost.com>.

Stockton is about 75 miles from either the San Jose or San Francisco airports. It is 50 miles from the Oakland airport and about 35 miles from the Sacramento airport. There are limited commercial flights into the Stockton Airport.



Cancellation Policy

If you need to cancel your enrollment, you may do so up to two weeks before the session and still receive a refund of your registration fee. After July 16, no refund or credit will be issued for any reason; but you may have a co-worker attend in your place.

Course Fee

Registration: \$3,095

(The course fee includes tuition, lunches, the Sunday evening reception, a group dinner on Thursday evening, and lecture and laboratory materials.)

SPECIAL OFFER: Register before July 1, 2010 and receive a free copy of *Introduction to Mass Spectrometry, 4th Edition*, by J. Throck Watson and O. David Sparkman, a \$100 value.

Continuing Education Units (CEUs)

Each course participant will receive a Certificate of Completion indicating the number of CEUs awarded for the class. The CEU is a standard measure for noncredit continuing education programs, with one unit given for each ten hours in the classroom.

Important!

Enrollment in this popular course is strictly limited to 24 people. We urge you to register today to ensure that you have a reserved seat in this unique course.

Other LC Resources Courses in Mass Spectrometry

LC Resources Open Enrollment Short Courses

Don't miss O. David Sparkman, Frederick E. Klink, and J. Throck Watson when they teach their popular lecture courses in various cities throughout the U.S. and Canada. Check the LC Resources Web site for details.

To register or to obtain more information about these courses, please visit the LC Resources web site at <http://www.LCResources.com>.

Interpretation of Mass Spectra

Instructor: O. David Sparkman

Learn strategic procedures which will be immediately helpful in the interpretation of mass spectra. Improve the way you approach and interpret mass spectra by understanding the physical and energetic processes imposed on a molecule during ionization. Reinforce your learning by working on carefully chosen real-life exercises. This course is offered in major urban centers around the U.S., as a Live-on-the-Web course, and can also be presented in-house at your company.

LC/MS: Fundamentals and Applications

Instructors: O. David Sparkman and Frederick E. Klink

For researchers, practitioners, technicians, and others who are currently using LC, LC/MS, or plan to use LC/MS in the future, and those dealing with data produced by LC/MS, this course is designed to provide a practical overview. Chromatographers just embarking on the technique will gain insight on how to select the appropriate instrument for different applications, and those currently using LC/MS and its data will develop an appreciation for, and an understanding of, the complexities of the data generated. This course is offered in major urban centers around the U.S., as a Live-on-the-Web course, and can also be presented in-house at your company.

Peptide and Protein Characterization with Mass Spectrometry

Instructors: Frederick E. Klink and J. Throck Watson

Protein chemists who are new to mass spectrometry or are considering LC/MS or MALDI will benefit from this introduction to the technique. Experienced MS analysts who find themselves confronting protein analysis problems will also benefit from the practical advice and applications overview. All attendees will come away with a basic knowledge of state-of-the-art approaches to protein analysis by MS and will find the well-organized course manual a useful tool to have in the lab as well as an invaluable source of references. This course is offered in major urban centers around the U.S. and can also be presented in-house at your company.

LC Resources In-House Courses

These short courses can be presented in-house—at your company or organization—and at your convenience, when it best fits your schedule. LC Resources In-House courses can also be customized according to the subject matter you want to emphasize and/or the length of time you want to schedule. LC Resources In-House courses are the most convenient and economical training option when you have 10 or more scientists or technicians who need training. For more information, call LC Resources at (800) 379-5221, or e-mail us at info@LCResources.com.

Registration Form

For fastest service, register online at the LC Resources web site at **www.LCResources.com**. Or, fax this completed form to LC Resources at **(925) 977-9375**. A credit card number or government training form is required to process all online or faxed registrations. See below for payment options. If you have questions, call LC Resources at **(800) 379-5221**; e-mail: info@LCResources.com.

Please enroll me in the LC Resources short course, **Chromatography/Mass Spectrometry: Principles and Practice**, to be held Monday–Friday, August 2-6, 2010, at the University of the Pacific in Stockton, CA.

CHECK ONE: Normal Registration: \$3,095 30-day Advanced Registration *and free book*: \$3,095

How did you hear about this course? On the LC Resources web site From an LC Resources e-mail
 From a Colleague An LC Resources Brochure Other _____

Name and Title of the Person Who Approved This Course _____

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Check enclosed. Make check payable to LC Resources, Inc. To avoid delay in having your registration processed, send the check and registration form by priority mail to: LC Resources Inc., 1295-F Boulevard Way, Walnut Creek, CA 94545, USA.

Government training form or purchase order enclosed. This option is available for federal or state government employees only. Note: We must receive a printed or faxed copy of your purchase order or training authorization form. Payment is expected prior to attending the short course.