This document describes the course that can be given at your site.
It also applies in large part to the public versions of the course.

Enzyme and Binding Assays in Drug Discovery

John C. Owicki, Ph.D.

- Enzyme and binding assays constitute a major part of the analytical effort in drug discovery, and improvements in them can have a high payoff.
- Enzyme kinetics and ligand-receptor interactions are taught in a typical university biochemistry class, but the goals and conditions in a drug-discovery laboratory are often different from those that apply to textbook treatments of the subject.
- Now you can have a review of principles and applications in drug discovery presented at your site by an instructor with strong credentials in industrial research and development, academic research, and teaching.

Why Hold the Course at Your Site?

- It will improve your ability to optimize assays for the goals at hand.
- It is convenient. You provide only a room and a projector (plus reproduction of course notes for courses presented outside North America). There are no travel hassles. There is a single pre-negotiated all-inclusive payment.
- It is economical compared with the travel of a group of people to off-site training.
- It can be customized to meet your needs.
- Continuing education for professional development is good business.

Who Should Attend?

- Scientists
- Technicians
- Engineers
- Technical managers
- Some familiarity with enzyme and binding assays is helpful but is not essential with a sound technical background.
- Special arrangements can be made for people with less technical experience, e.g., many sales representatives

Length of the Course

- The course is normally given as a one-, one-and-a-half-, or two-day presentation.
- More specialized half-day presentations can be arranged within the San Francisco Bay area.

Learning Objectives

- Master the basic concepts underlying enzyme and binding assays
- Learn how applications in drug discovery sometimes dictate assay optimization and interpretation that differ from textbook recommendations.
- Learn how best to extract the information you need from your assays

Topics and Course Customization

Below is a list of topics that are available for presentation. It may be possible to include topics that are not on the list. If you're interested in that, contact Jack Owicki to discuss feasibility.

- **Review of biomolecular binding**
  - Equilibrium conditions and equations
  - Binding kinetics
  - Specific vs. nonspecific binding
  - Effects of ligand depletion on equations for binding equilibria
- **Review of enzyme kinetics**
  - Michaelis-Menton kinetics
  - Enzyme inhibition:
    - Competitive
    - Noncompetitive
    - Uncompetitive
    - Irreversible
    - Promiscuous
  - Single- vs. multiple-substrate enzymes
  - Cooperativity in enzyme kinetics

- **Deviations from classic textbook behavior**
  - Interferences from library compounds
  - Effects of slow binding kinetics on binding assays and enzyme assays
  - Enzyme inactivation during assay incubation
- **Optimization of assays for primary and secondary screening**
  - Dependence of biochemical optimization on detection method
  - Optimization for robustness of signal vs. optimization for ease of extracting molecular parameters
  - Conditions under which high concentrations of ligand or substrate (above K_d or K_m, respectively) can improve assay sensitivity
  - Conditions under which a high fractional conversion of substrate can improve sensitivity.
  - Interferences in kinetic vs. endpoint assays
- **Statistical measures of assay quality**
  - Signal, background, and noise
  - Z and Z' factors as technology-independent measures of assay quality
  - Other measures of assay quality, such as signal window and assay variability ratio
  - The lower detection limit and its uses
  - The noise in noise measurements; what it takes to measure standard deviations precisely
- **Understanding mechanisms and extracting information from your data**
  - What steady-state enzyme kinetics can and can't tell you
  - IC_{50} vs. K_i and problems with the Cheng-Prusoff equation
  - The use and misuse of linearizations such as Scatchard and Lineweaver-Burk plots
  - Extracting parameters from data by nonlinear regression
  - The importance of error bars on extracted parameters and correlations between errors in parameters such as B_{max} and K_d
  - Commercial software for data analysis and simulation
- **Case studies**
  - Receptor binding
  - Kinases
  - Proteases

About the Instructor

Jack Owicki is an independent consultant with extensive experience in bioanalytical methods for drug discovery. As Vice President for Research at LJL BioSystems and Associate Technical Director at Molecular Devices, he was involved in the research and development of successful commercial fluorometric systems for high-throughput screening.

Prior to his industrial work, he was Assoc. Prof. of Biophysics at the Univ. of California, Berkeley, where he investigated intermolecular interactions in membranes, also teaching graduate and undergraduate biophysics courses. He was a post-doc in Biophysical Chemistry at Stanford Univ., holds a Ph.D. in Biophysical Chemistry from Cornell Univ., and M.S. and B.S. degrees in Biochemistry from Michigan State University.

The author of over 60 technical articles and patents, he was on the Program Committee for the 2001 Annual Meeting of the Society for Biomolecular Screening (SBS), chairing the session on Advances in Detection Technologies. He coordinated the short-course program at the Annual SBS Meeting in 2003 and again has this role in 2004.

He has been on the editorial boards of the Journal of Biomolecular Screening, the Journal of Fluorescence, the Biophysical Journal, the Annual Review of Biophysics and Biomolecular Structure, and the Journal of Biomedical Optics.

In addition to his regular consulting over the past nine years, he has successfully presented courses on methods in drug discovery at many conferences, under the auspices of the Society for Biomolecular Sciences, Select Biosciences, and IBC. He has also given the course at many industrial sites, including pharmaceutical companies, biotech companies, and companies that vend instruments and reagents for drug discovery.

Cost

The cost depends on the length of the course, the number of attendees, and travel considerations. There is an all-inclusive fee that generally ranges from $5,000 to $15,000, higher outside North America. Contact Jack Owicki to discuss your needs and obtain a quote.

Contact Information:
John C. (Jack) Owicki, Ph.D.
Owicki Consulting
956 North California Avenue
Palo Alto, CA 94303
Tel 650 565-9690
Fax 650 857-9680
Email jack@owicki.com
Web www.owicki.com