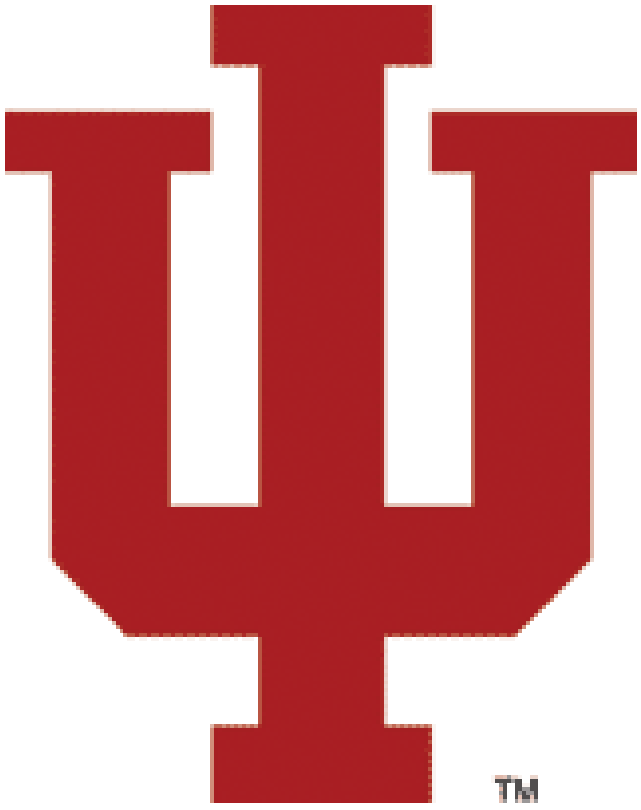
Indiana University Physical Biochemistry Instrumentation Facility

User Handbook

2006-2007



Interdisciplinary Program in Biochemistry
Indiana University
800 East Kirkwood Avenue
Bloomington, Indiana 47405
(812) 256-7505

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Welcome

It is my pleasure to welcome users to the Physical Biochemistry Instrumentation Facility at Indiana University, Bloomington. Over the past several years there has been a rapid increase on our campus of research into the structures, stabilities and interactions of biomolecules. This new Facility has been established to facilitate and encourage these research endeavors and to provide a centralized resource for training and education in modern physical biochemistry. We hope that other research organizations in the region will also benefit from the Facility.

The Physical Biochemistry Instrumentation Facility would not exist without the strong support of Faculty and administrators at Indiana University. I want to thank Carl Bauer, Chair of the Interdisciplinary Biochemistry program, for prioritizing the support of this Facility and Dean Kumble Subbaswamy, Chemistry Chair David Clemmer, and former Biology Chair Jeffrey Palmer for providing the funds for hiring our Facility manager, Dr. Todd Stone, who is doing an outstanding job directing this valuable resource. David Clemmer has also allocated Chemistry Department space for the Facility and Biology Chair Beth Raff has offered support for the future relocation of the Facility into the Multidisciplinary Sciences Building, where it will best serve the interests of the growing IU biochemistry community. Many IU faculty members (past and present) have written shared instrumentation grants and/or contributed from their own research funds to allow the purchase of state-of-the-art biophysical instrumentation. I wish to thank the following individuals for dedicating their time and efforts: Martha Oakley, Andrew Feig, John Richardson, David Daleke, Jim Drummond, Don Burke, Jay Tang, Yves Brun, Peter Cherbas, Cheng Kao, Jeff Zaleski, and Andy Ellington. Extramural funding for the Facility instruments has come from the National Institutes of Health and the National Science Foundation, with intramural matching funds from Research and the University Graduate School (RUGS) and the Departments of Chemistry and Biology.

Last, but by no means least, I want to thank the several generations of graduate students and postdoctoral associates who have already made a number of exciting discoveries using the Facility instruments. It is my hope that the Physical Biochemistry Instrumentation Facility will contribute to the educational experience and joy of discovery by present and future students and postdocs as well as encouraging new collaborative interactions between labs.

Martin J. Stone, Facility Director

I. Facility Overview

A. Goals: The primary goal of the Facility is to MAINTAIN AND DEVELOP RESOURCES TO PROVIDE MAXIMUM BENEFIT FOR THE USERS. The instruments in the Physical Biochemistry Instrumentation Facility will be shared by many users. Therefore, it is essential that fair and effective procedures for usage of this valuable resource are implemented. With this in mind, we will strive to:

   a. Ensure instruments are used effectively and to the greatest scientific benefit of the users,

   b. Ensure efficient and fair allocation of instrument time,

   c. Ensure the safety of all users,

   d. Prevent damage to instruments and accessories which would degrade performance,

   e. Ensure any technical problems or accidental damages are promptly reported and repaired, and

   f. Provide mechanisms for future development of the Facility, including upgrading, replacement, or acquisition of instruments.

B. Establishment: The Indiana University Physical Biochemistry Instrumentation Facility was established by a joint effort on the part of the IU Interdisciplinary Biochemistry Program, and the Departments of Chemistry, Medical Sciences and Biology, working in close cooperation with the Dean of the College of Arts and Sciences. The Facility will be an essential resource for biochemistry researchers and will help establish the necessary infrastructure for growth and development of the various departmental programs involved. In addition, it will complement other available assets such as the Proteomics R&D Facility, the Indiana Molecular Biology Institute, and Center for Genomics and Bioinformatics.

C. Facility Access: The Facility is open to Indiana University biochemistry researchers, upon completion of appropriate instrument certification and training. Usage by extramural users is also highly encouraged, subject to time availability.

D. Location: The Facility is located in the Indiana University Department of Chemistry at 800 East Kirkwood Avenue (on the South side of the Indiana Memorial Union). The majority of instruments are located in Room A600, with the exception of the Circular Dichroism Spectrometer (A715), and the Scintillation Counter (A621).

a. Hours of operation: Normal operating hours are 8:30 am to 5:00 pm, Monday through Friday. Users wishing to conduct after hours experiments may do so by obtaining a Facility key, subject to authorization by the Facility Manager.

b. Directions to Facility

i. From the **North**: Take IN-37 S to the College Avenue exit, continue south to 7th Street. Turn left onto 7th and proceed to the Indiana Memorial Union. Visitor pay parking is available at the IMU.

ii. From the **South**: Take IN-37 N to Bloomington. Exit onto IN-45 / 46 E and follow to College Avenue. Turn right onto College Avenue. Continue south to 7th Street. Turn left onto 7th and proceed to the Indiana Memorial Union. Visitor pay parking is available at the IMU.

iii. From the **East**: Take IN-46 W into Bloomington. IN-46 E becomes 3rd Street. Follow 3rd Street to Indiana Avenue. Turn right onto Indiana Avenue and continue north to 7th Street. Turn right onto 7th and proceed to the Indiana Memorial Union. Visitor pay parking is available at the IMU.

iv. From the **West**: Take IN-46 E into Bloomington. Turn right onto College Avenue. Continue south to 7th Street. Turn left onto 7th and proceed to the Indiana Memorial Union. Visitor pay parking is available at the IMU.

v. From the **IMU parking lot**, follow the pathway around the left side of the building to the road behind the Union. The Chemistry building is now

directly ahead. Enter through the set of double doors on the northwest (right) side of the building facing the IMU. Follow signs toward the Library. Take the elevator closest to the Library entrance to the 6th floor. The Facility is located in Room A600, which is the second door on the right as you exit the elevator.

E. Administration: The Physical Biochemistry Instrumentation Facility is administered by a Director, Facility Manager, and a Faculty Executive Committee, whose responsibilities include setting procedures for training and supervision of users, developing policies for instrument usage, and determining fee structures. The current Facility personnel are:

Director: Dr. Martin Stone (Chemistry)
Facility Manager: Dr. Todd Stone (Chemistry)
Faculty Executive Committee:
Martin Stone (Chair), Andrew Feig (Chemistry), David Daleke (Medical Sciences), James Drummond (Biology), and Carl Bauer (Biochemistry Program Chair)

F. Web Access: Users may access information regarding instruments, policies, and other useful facts via the Physical Biochemistry Instrumentation Facility website. Currently, requests for training and to reserve time for instrument use are available online to facilitate ease of use. In addition, important news and tips will be frequently posted. Please feel free to visit us often and submit your comments or suggestions at http://www.indiana.edu/~physbio.

II. Facility Instruments

Instrument[1]	Make	Model	Year Purchased	Location	Major Applications
Fluorometer	**Perkin Elmer**	**LS50B**	**2001**	**A600**	**Structure, folding, binding thermodynamics and kinetics**
Analytical Ultracentrifuge	**Beckman Coulter**	**Optima XL-I**	**1998**	**A600**	**Self-association (size, shape, and thermodynamics)**
Isothermal Titration Calorimeter	**Microcal**	**VP-ITC**	**2003**	**A600**	**Thermodynamics of binding**
Variable Mode Imaging System	**Amersham Biosciences**	**Typhoon 9210**	**2003**	**A600**	**Quantitation of gels, plates, autoradiograms, etc.**
Circular Dichroism Spectrometer	**Jasco**	**J-715**	**1999**	**A715**	**Structure and interactions**
UV/Visible Spectrometer	**Varian**	**Cary 100 Bio**	**2001**	**A600**	**Thermodynamics of folding and kinetic assays, oligonucleotide melting**
Dynamic Light Scattering	**Malvern**	**Zetasizer Nano-S**	**2004**	**A600**	**Particle size distributions, diffusion coefficients, and molecular weight information**
Surface Plasmon Resonance	**BIACORE**	**3000**	**2001**	**A600**	**Kinetics of binding, binding hierarchies, concentration studies**
Scintillation Counter	**Packard**	**1600TR**	**1994**	**A621**	**Quantitation of assays and substrates**

[1]Sources of instrument capital funding:

Fluorometer: Stone, Oakley, Richardson, Feig, and Tang groups.

Analytical Ultracentrifuge: Stone, Oakley, Brun, and Cherbas groups, NIH Shared Instrument Grant, and matching funds from the Indiana University Department of Biology.

ITC: Stone, Oakley, and Feig groups.

Variable Mode Imaging System: Feig, Burke, and Oakley groups as well as the NSF.

Circular Dichroism Spectrometer: Stone, Oakley, Zaleski, and Ellington groups with matching funds from the Indiana University Department of Chemistry.

UV / Visible Spectrometer: Burke and Kao groups with matching funds from the Indiana University Department of Chemistry.

Scintillation Counter: Ellington group.

Dynamic Light Scattering: Physical Biochemistry Instrumentation Facility and various biochemistry faculty.

III. User Fees

A. All instrument usage is on a fee-per-use basis.

B. The fee structure has been determined so as to cover only the necessary operating expenses of the Facility, including supplies, routine maintenance, computer software and hardware upgrades, replacement of consumable items, and occasional repair visits. The fees do **NOT** contribute to the capital cost of the instruments, nor to the Manager's salary or benefits. Thus, the fees are the *minimum* they may reasonably be to support operation of the Facility.

C. Facility Membership and Usage: Faculty members affiliated with the Indiana University Interdisciplinary Biochemistry program will be required to pay an annual Facility Membership fee of $200 for fiscal year 2005-2006. Researchers whose primary affiliation is with a Facility Member are eligible for discounted instrument usage rates. Academic research groups outside the aegis of the Biochemistry Program may also conduct experiments on Facility equipment at the Academic rate, but may choose to become Facility Members by paying the same fee. Non-academic researchers are invited to contact the Facility Manager to discuss usage arrangements.

D. Instrument usage fees are based on a two tiered structure as outlined below:

Instrument	Location	Member Rate[1]	Academic Rate[2]
Fluorometer	A600	$5 / hour	$10 / hour
Analytical Ultracentrifuge	A600	$50 / day	$100 / day
Isothermal Titration Calorimeter	A600	$5 / hour	$10 / hour
Typhoon Imager	A600	$2 / scan	$4 / scan
Circular Dichroism Spectrometer	A715	$5 / hour	$10 / hour
UV / Visible Spectrometer	A600	$5 / hour	$10 / hour

Dynamic Light Scattering	A600	$5 / hour	$10 / hour
Surface Plasmon Resonance	A600	$5 / hour	$10 / hour
Scintillation Counter	A621	$5 / hour	$10 / hour

[1]The Member Rate is applicable to researchers whose primary affiliation is with a Facility Member. Members are also entitled to discount night rates of $1 per hour on all instruments with the exception of the Analytical Ultracentrifuge. Night rates are in effect between 10:00 pm and 8:00 am.

[2]The standard Academic Rate is applicable to other Indiana University researchers and extramural academic researchers. Discount night rates of $2 per hour on all instruments are applicable with the exception of the Analytical Ultracentrifuge. Night rates are in effect between 10:00 pm and 8:00 am. Note that Facility Members will be given scheduling priority on all instruments.

IV. User Training and Certification

A. In order to promote fair laboratory practices, prevent costly instrument damage, and ensure user safety, the Physical Biochemistry Instrumentation Facility will offer user training and certification on all equipment under its control (see Table of instruments in Section II above). Qualification is **MANDATORY** – all persons wishing to use Facility equipment MUST successfully complete outlined training requirements set forth by the Facility Manager. The basic outline for qualification includes but is not limited by the following guidelines:

   a. Prospective users must submit a Training Request Form (included in this packet and available on the Facility web site) outlining the instruments desired for qualification, applications for which the instrument will be used, description of samples to be run, disclosure of potential health or safety hazards, and account information for billing purposes. Training courses will ideally be

conducted for a minimum of 2 students per session. Special arrangements for training may be entertained at the discretion of the Facility Manager, Director, and Faculty Executive Committee.

b. In addition to training forms, a signed copy of the Facility Release Form **MUST** be obtained before any training commences. This form (also included in this packet and on the web site) ensures the prospective user has read and understood the Facility's policies regarding rules, regulations, safety, reporting of accidents or instrument misuse, malfunctioning equipment, etc. The form must be signed by the user as well as the Faculty sponsor.

c. Once the necessary paperwork has been filed with the Facility Manager, a mutually agreeable time will be arranged for training sessions. The user should become familiar with operational basics by reading the instrument training booklet before the session begins. At this time, the Facility Manager will train the user to operate equipment properly and will remind the user of his / her responsibilities regarding data backup, cleanliness, safety, and appropriate procedures for reserving instrument time. After a number of sessions to be determined by the Manager, the user will be deemed qualified to operate the instrument under initial supervision, and once proficiency has been established, unsupervised.

d. The user will be given a Facility account on the computer controlling the instrument(s) upon which he / she has been certified, and will be authorized to conduct research as needed. Facility computer systems are networked, allowing users to freely transfer data to their office / lab computers. Note that **DATA BACKUP IS THE RESPONSIBILITY OF THE USER** and Facility personnel cannot be held responsible for integrity of data left on computers within the Facility after the user has logged out. As a courtesy, every effort will be made to notify equipment users before hard drives are cleared, but computers within the Facility are meant for instrument control and data collection only, not long term data storage. Most instruments are equipped with CD burners for user convenience.

B. Workshops and Seminars: Throughout the year, the Facility will offer occasional seminars and workshops designed to increase awareness about our capabilities and also to provide key tips and tricks for users so they may receive maximum benefit from the equipment housed in the laboratory. Once annually, the Facility Manager will organize a User's Meeting to obtain feedback and address issues or concerns. All events will be posted in advance within the Facility and will be distributed to all registered users via e-mail.

IV. Instrument Reservations

The Physical Biochemistry Instrumentation Facility will maintain regular hours of staffed operation on Monday through Friday from 8:30 am to 5:00 pm. After hours access will be granted to trained, qualified users through key access. Since shared instrument time is limited due to the quantity of researchers, the equipment will be managed by a reservation system. An Internet based reservation system is currently used to streamline the booking process and allow users to plan experiments accordingly. Guidelines for booking instrument time are set forth below:

A. Facility instruments will be made available to all biochemical researchers at Indiana University Bloomington, subject to completion of appropriate training (see Section IV) and approval by the Facility Manager.

B. Extramural academic will also be welcome to use the Facility instruments, subject to availability. Inquiries should be directed to the Facility Manager. Non-academic users should contact the Facility Manager to negotiate arrangements. Please note that Facility Members will be given scheduling priority on all instruments.

C. Facility equipment will **NOT** generally be made available for research in areas other than biochemistry. Exceptions will require expressed permission of the Facility Director.

D. Trained users with valid Facility accounts may reserve equipment at any time, but are expected to maintain a courteous use of instruments by adhering to Facility policies:

a. Each research ***group*** may ordinarily reserve an instrument for a maximum of 4 days per week among its members. Additional time will be made available if there is no competing demand by other group labs; other groups will be given priority if reservations are made greater than 24 hours in advance.

b. ***Individual*** users may reserve instruments for a maximum of 2 consecutive days, after which others must be given an opportunity to use the equipment. A user must allow a **mandatory** 2 day wait period before more instrument time may be allocated. Additional time will be made available if there is no competing demand by other users; other users will be given priority if reservations are made greater than 24 hours in advance.

c. If a user has reserved a block of time greater than 2 hours and fails to use the equipment after 1 hour, the reservation will be forfeited, the user billed for that time block, and others may immediately begin using the instrument, provided they follow the established reservation procedure. If an experiment is delayed due to sample preparation difficulties, the user may avoid a penalty by notifying the Facility Manager and leaving a note on the instrument within 1 hour of the reservation start time. Note that excessive no-shows will result in disciplinary action by the Facility Manager and could result in loss of instrument privileges.

E. Qualified users may reserve time on an instrument immediately when no other scheduled activity is present. However, please allow ample time for completion of the experiment and cleanup if another user has upcoming reserved time so no conflicts will arise.

F. Cleanliness is a **MUST** for all users. The laboratory space around the instrumentation must remain free of dust, debris, and personal items. Failure to maintain a clean workspace will mandate cancellation of instrument qualification and suspension of Facility privileges, at the discretion of the Facility Manager.

G. Please be sure to enter all pertinent information into the logbooks located at the instrument workstation during each session.

H. ABOVE ALL, BE **CONSCIOUS**, **COURTEOUS**, AND **CONSIDERATE** OF YOUR FELLOW USERS!

V. Technical Problems and Equipment Damage

All users are expected to follow proper instrument operating procedures as well as the instructions of the Facility Manager in order to avoid instrument damage and other technical problems. In the event that a user encounters technical difficulties or damages a piece of equipment or an accessory:

A. Report the incident to the Facility Manager **IMMEDIATELY**. If the problem occurs after normal operating hours, fill out a Report Form (included in this packet or via the web) and submit it electronically to the Facility Manager by e-mail (tstone@indiana.edu) or print a copy and leave in the Manager's inbox in the laboratory.

B. Financial Responsibility: Damage to any instrument or accessory found to be due to user negligence or improper use will necessarily require repair or replacement of broken parts, and it will be the sole responsibility of the user and / or Faculty sponsor to furnish funds to do so. This guarantees that all who use the Facility will be confident instruments are functioning normally and their valuable research time is well spent. In the event of a dispute, the Faculty Sponsor or non-academic patron may appeal to the Facility Manager, Director, and Faculty Executive Committee. Resolution of disputes by this governing body is binding and final.

C. Penalties: Failure to immediately report nonfunctioning equipment or user inflicted damage may range from a single warning to instant withdrawal of instrument privileges for an indefinite period. Reinstatement of instrument privileges will require user requalification through another training course, including all costs associated therewith.

VI. Laboratory Safety

A. All qualified users of the Facility are expected to follow good laboratory practices in the handling of chemicals, waste, and radioactive material as described by the policies of the Indiana University Department of Chemistry.

B. During training sessions, new users will receive information regarding the location of fire extinguishers, eye wash stations, and the standard procedure for reporting of accidents. A phone is available in the laboratory for **EMERGENCY USE ONLY**.

VII. After Hours Key Access

A. Researchers with keys for after hours entry accept all responsibility for proper use, as outlined in the Physical Biochemistry Instrumentation Facility policies and guidelines. Failure to abide by Facility regulations will result in loss of key and / or instrument privileges. Users who are approved by the Facility Manager for after hours key access to the laboratory must follow the guidelines set out below:

   a. User acknowledges that key access is restricted **ONLY** to the user. Under no circumstances should a user grant Facility access to unregistered or unqualified persons.

   b. User understands that the key is property of Indiana University and will be solely responsible for all costs associated with lost keys or replacements.

   c. After hours, it is the responsibility of the user to confirm that Facility doors are properly locked upon departure. A user found to be negligent in this regard will lose key privileges and will be held liable for replacement of any missing or damaged equipment from the laboratory.

   d. Users must notify the Facility Manager if their status with the University changes (leaving, graduating, etc.) and are required to surrender all keys to the Facility at that time.

e. Failure to use a Facility key conscientiously will necessitate revoking the user's key access to the laboratory.