# Rodent Microsurgery and Hemodynamic Measurements Training Program

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Welcome to the InsideScientific Rodent Microsurgery and Hemodynamic Measurements Training Program proudly hosted by Dr. Timothy A. Hacker and his research team at the University of Wisconsin - Madison.

Our professional microsurgical training program is intended to provide both novice and experienced research scientists with the knowledge and skills required to excel their research in the realm of cardiac function and hemodynamic measurements in rodent models to the next level.

Participants will have an opportunity to learn or review the foundations of carrying out a successful cardiac research protocol including proper sedation, intubation, temperature control, vessel isolation and hydration during surgery. There will be a significant focus on the creation of more challenging cardiac disease models and advanced techniques for studying hemodynamics and cardiac function. Examples include using pressure-volume loops to study contractility, energetics, and diastolic dysfunction and studying the right ventricle by PV loops to characterize pulmonary hypertension and right ventricular function. An introduction to surgical models of chronic myocardial infarction, ischemia and reperfusion, heart failure and cardiac hypertrophy will be offered.

# Course Sponsors

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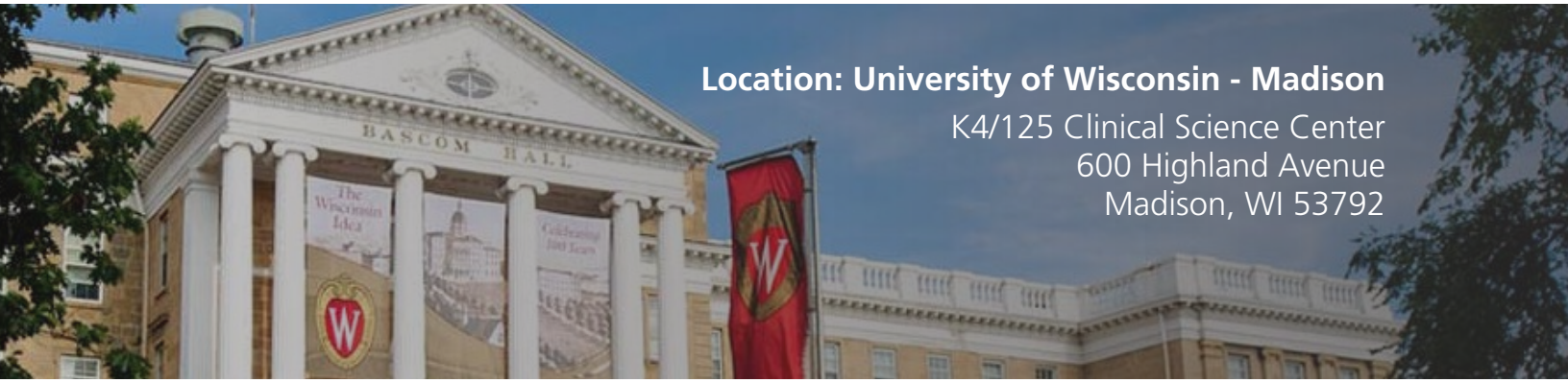
# Course Information




**Location: University of Wisconsin - Madison**
K4/125 Clinical Science Center
600 Highland Avenue
Madison, WI 53792

## Instructors:

**Dr. Timothy A. Hacker** is a Senior Scientist and Director of the Cardiovascular Physiology and Surgery Core Facility at the University of Wisconsin-Madison. His work at the Core Lab facility provides researchers with surgical models of disease, non-invasive imaging and physiologic monitoring of the disease process. Dr. Hacker has established cardiac disease models in mice, rats, rabbits, pigs, dogs and primates. His lab documented the variability in mouse coronary anatomy and was the first lab to publish right ventricular pressure-volume data in mice.

**Ms. Allison Brodbeck** is an assistant researcher in the Cardiovascular Physiology and Surgery Core Facility. Ms. Brodbeck has worked with species ranging from mice and rats to pigs and dogs, even exotic species including cetaceans and pinnipeds. Her work at the Core Lab primarily focuses on quantifying cardiovascular surgical models with noninvasive imaging, including echocardiograms, laser Doppler, bioluminescence imaging and fluorescence imaging. Allison is also instrumental in project management, animal surgery and data analysis.

**Dr. Rachel Taylor** has a BS in Animal Science and a PhD in Biochemical and Molecular Nutrition from UW-Madison. Her doctoral research focused on metabolism of the trace element selenium in turkeys. Additionally, she has worked extensively with mice, rats, chickens and pigs. Currently Dr. Taylor is an assistant researcher in the Core lab and her work focuses on rodent microsurgery, including creating models of myocardial infarction, pneumonectomy and acute limb ischemia.

# Program Details:

Conveniently, the laboratory training portion of this program is supplemented with course material delivered in advance by webinar – this ensures registrants are adequately prepared and maximizes hands-on time in the lab. The course begins with an emphasis on the building blocks for any successful and repeatable surgical procedure including sedation and anesthetic protocols, body temperature control and blood gas sampling. Techniques for monitoring and controlling physiological parameters such as respiration, heart rate (ECG) and blood oxygenation (SPO2) will be a central part of all the hands-on protocols.

Course attendees will gain in-depth experience using catheter-tipped pressure transducers and pressure-volume catheters as the primary means of studying cardiac performance in both open and closed-chest models. Attendees will learn how to monitor and analyze baseline hemodynamic data as well as advanced PV loop indices of function including preload, afterload, contractility, lusitropy and heart-vasculature interactions. Attendees also have the option of learning how to acquire and analyze right ventricular PV loops. The course focuses on survival models of cardiac dysfunction including myocardial infarction and aortic banding: learning objectives include how to create models of disease consistently and the associated methods for studying changes in function.

## Learning Outcomes:

- foundations in rodent surgery – microscopy, tools and optimization of surgical area
- sedation, intubation, vital signs monitoring and vessel isolation for blood pressure catheterization
- open and closed-chest surgical approaches for accessing the left, or right, ventricle
- introduction to Pressure-Volume Loop measurements
- survival procedures, including myocardial infarction and aortic banding models (others upon request)
- advanced PV loop concepts including contractility, energetics, and work
- how to record and analyze load independent measurements of function (ESPVR, EDPVR, PRSW)
- proper statistical analysis of hemodynamic data and how to present data for publication

**Program Customization:** Training is available for procedures and use of technology beyond those listed in the learning outcomes for this course. Upon request, Dr. Hacker and his team will gladly allocate time during the course or following the standard two and half day program to offer a tailored experience. Potential topics may include:

- using complementary technologies with PV Loops, such as echocardiography, ECG, blood flow and blood pressure (invasive/noninvasive)
- placement of intravenous (jugular) catheters for direct delivery of hormones and compounds
- creating disease models, including: myocardial infarction, ischemia/reperfusion, pulmonary artery constrictuion, trans-aortic artery constriction (TAC)
- subcutaneous implantation of osmotic minipumps or pellets for compound delivery

# Additional Details

Hosted in vibrant Madison, Wisconsin, course registrants receive preferred rates to local lodging, transportation to and from campus and an evening networking dinner with course instructors and fellow classmates. Our promise is to provide an excellent experience both in and out of the classroom.

## Lodging:

Discounted rates have been negotiated for course attendees at the Best Western Plus InnTowner of Madison. We ask that all attendees stay at this hotel during the course to simplify transportation. However, attendees are welcome to stay at an alternate location should they wish to also arrange their own transportation to and from the lab. The Best Western Plus InnTowner offers the following comforts and ammenities:

- Free high-speed internet access
- Free parking
- Indoor pool and whirlpool
- Fitness Center
- 24/7 Business Center
- 24/7 Snack Market

## Transportation:

For those arriving in to Dane County Regional Airport in Madison, shuttle service from the airport to The Best Western Plus InnTowner will be available at set times during the afternoon and the Tuesday evening prior to the course start date. In addition, a shuttle will be arranged to take attendees from the lab to the hotel and airport after the course is over. Round-trip transportation will also be provided for all attendees the evening of the networking dinner.

## Meals:

Attendees will be provided lunch and coffee while in the laboratory. An evening dinner will also be enjoyed with fellow course attendees and instructors on the Wednesday evening. Registrants are provided information on the specific restaurant and available menu prior to attending the course. We welcome attendees to contact organizers in advance to discuss any dietary restrictions and allergies to ensure an enjoyable evening.

# Course Agenda

*Upon registration, attendees are granted access to all webinar recordings, slide-decks and support material. This allows registrants to study prior to visiting the lab in Wisconsin for surgical training.*

## Webinars:

- Basic Hemodynamic Principles Viewed Through Pressure-Volume Relations [D. Burkhoff, MD]
- Advanced Concepts in Pressure-Volume Analysis [D. Burkhoff, MD]
- General Surgery Training [Harvard Apparatus] & Introduction to Surgical Monitoring [Indus Instruments]
- Introduction to Pressure, Flow and Pressure-Volume Loop Measurements [Transonic]
- Advanced Applications of Hemodynamics in Preclinical Research [Transonic]
- Murine Hemodynamic Surgical Operating Procedures: Part 1 and 2 [P. Escobar, DVM & D. Escobedo]
- Data Acquisition Essentials for Cardiovascular Research Applications [ADInstruments]
- Advanced Data Acquisition for Hemodynamics [ADInstruments]

## Laboratory Component:

### Day 1: Foundations in Rodent Hemodynamics

7:45 – Shuttle from Hotel to Campus

8:00 – *Coffee & Introduction*

8:30 – **Demonstration and Training Session*:** Surgical Preparation, Sedation, Intubation and Vital Signs Monitoring

12:00 – *Lunch*

1:00 – **Demonstration and Training Session*:** Vessel Isolation, Open and Closed-Chest Surgery for Left Ventricle Access & PV Loop Catheter Insertion

5:00 – Session Review

5:45 – Shuttle back to Hotel

7:00 – *Group Dinner*

### Day 2: Mastering PV Loops, MI and TAC

7:45 – Shuttle from Hotel to Campus

8:00 – *Coffee & Introduction*

8:30 – **Demonstration and Training Session*:** Myocardial Infarction by LAD Occlusion & Left Ventricular Hypertrophy by Aortic Band

12:00 – *Lunch*

1:00 – **Open Training Session:** Attendees focus on surgical skills and hemodynamic measurements of their choosing

5:30 – Session Review

6:00 – Shuttle back to Hotel

### Day 3: PV Loop Data Analysis

7:45 – Shuttle from Hotel to Campus

8:00 – *Coffee & Introduction*

8:30 – **Training Session:** Pressure-Volume Loop analysis using ADI LabChart and PVLoop Workflows Software

12:30 – *Lunch & Closing Remark*

1:15 – Shuttle back to Hotel

** Day 1 and 2 Demonstration and Training Sessions are flexible. Specifically, attendees can choose to focus on the techniques and surgeries of most interest to them. The needs and goals for each Attendee are reviewed prior to visiting the lab in Wisconsin.*

# Registration Information

## Course Fee:

admission to the workshop, including access to online content via InsideScientific:

**Industry Rate: $3,295 USD,  Academic Rate: $2,795 USD**

For convenience, InsideScientific provides an online application form for scientists interested in registering. Access the form at the following URL:

bit.ly/2DOYpqr

Following completion of the online form an event coordinator will contact you to discuss payment options. Alternatively, you can complete the Workshop Registration Form on the following page and email to InsideScientific at the following address: events@insidescientific.com.
Please use subject line "Rodent Microsurgery Workshop"

## Payment & Cancellation Information:

For the security of our registrants, InsideScientific does not collect payment information within online forms.

Course registration is not confirmed until you have received official communication from InsideScientic including a registration invoice.

Please do not make travel plans until you have received an enrollment confirmation. Deadline for registration is 14 days prior to the event.

Workshop seating is limited to 6 participants.  InsideScientific reserves the right to cancel and/or reschedule/combine workshop programs for a later date.

Registrant cancellations must be received no later than 14 days prior to the event to receive a 50% refund of the registration fee. No refunds will be issued if cancellation is received less than 14 days prior to the event.

Advanced payment in full is required to reserve your space. Courses will be filled on a first-come-first-served basis in the order that payment is received.

# Workshop Registration Form (email)

please complete the form below and send your application with complete payment details to events@insidescientific.com.

## Registrant Information

| First Name: | Last Name: | Title/Position: |
|---|---|---|
| Institution: | Department or Division: | |
| Institution Address: | | |
| City: | State or Province: | Country: |
| Telephone (including Country code): | Email: | |

Please indicate the course (date) you wish to attend:

Course Fee (USD): Please circle the appropriate rate

$3,295 industry

$2,795 academic

How did you hear about this Program?

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- ☐ Harvard Apparatus
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- ☐ ADInstruments
- ☐ Indus Instruments
- ☐ Social Media
- ☐ Referral from a Friend/Colleague

## Payment Information

** The card security code is a unique three or four-digit number printed on the back of the credit card. It is usually found at the top or right side of the signature strip.*

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| Card Number: | Expiry Date: |
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