



## Description of the Internship Position:

### Training Provided:

Training will be provided at the Vermont Biomedical Research Network (VBRN) Proteomics Facility. Trainees will learn modern proteomics approaches using state-of-the-art mass spectrometry instrumentation, as well as acquire skills that will be useful for their future careers in academia and industry, such as scientific literature interpretation, experimental design, operation of analytical lab instrumentation, and data analysis. Training and learning will be guided by a specific set of goals and expectations highlighted at the beginning of the program. Interns will work directly with the facility personnel for the entire period of the internship. Such a close mentor-mentee relationship will allow flexibility to adjust the learning objectives/experiences according to individuals' interests, time commitment, and career aspirations.

### Training Structure:

The intern will be trained in the first semester through a proteomics "boot camp" exercise involving protein identification and quantification or structural proteomics. If the intern is interested in continuing the internship for the second semester, active participation in a pilot project will be arranged focusing on improving or developing new proteomics methods. The summer internship will be a combination of those 2 semesters of training. These methods, when established, will be applied to ongoing collaborative projects with both UVM investigators and external collaborators. Alternatively, trainees can choose to work on existing collaborative projects with investigators. *There are opportunities to present findings at professional events, including VBRN Career Day and UVM Student Research Conference.*

## Work Environment:

The VBRN Proteomics Facility is committed to providing full support to investigators in their work by offering a complete panel of proteomics services and training opportunities. Trainees will be working in a dynamic environment where facility personnel interact frequently with users (principal investigators, postdocs, graduate students, and staff) from over 10 UVM departments and external investigators. The intern, if interested, could participate in various integrated facility operations, including consultations, lab discussions, and data analysis/interpretation. This could be a good opportunity for those who are interested in exploring various types of projects for graduate school. As the facility operates in a fashion very similar to other core facilities in academia and biotech/pharma industry, this position could also be a good transition to careers in those settings.

*Depending on their career aspirations, trainees can allocate their time between method development and core facility operation.*

## Vermont Biomedical Research Network (VBRN) Proteomics Facility:

The VBRN Proteomics Facility (<https://vbrn.org/proteomics/>), partly funded by the NIH IDeA Networks of Biomedical Research Excellence, has recently relocated to the Firestone Medical Research Building (FMRB). The facility enables investigators to use an array of state-of-the-art MS-based techniques for proteomics experiments, ranging from routine protein identification, post-translational modification characterization and finding protein interacting partners, to large-scale quantitative proteomics analyses using stable isotopes. Since its inception in 2006, the facility has facilitated data acquisition to support more than 200 publications (<https://vbrn.org/proteomics-publications/>). The facility personnel train investigators in experimental design and proteomics methods, as well as assist with data interpretation, manuscript preparation, and grant submission. Our user base includes investigators from UVM and institutions in 15 states. A summary of the facility's impact on the development of the network can be found at <https://vbrn.org/proteomics-impact/>.

## Potential Internship Projects:

Interns can be involved in:

1. Establishing structural proteomics methods (hydrogen-deuterium exchange & cross-linking MS; ETD-based disulfide bond elucidation)
2. Improving existing methods (e.g., comprehensive high pH fractionation of tandem-mass-tag labeled peptides; protein quantification using MS1 quantification, spectral counting, and data-independent acquisition)
3. Participating in facility users' projects

**Please contact the facility (Wai Lam: [yLAM@uvm.edu](mailto:yLAM@uvm.edu)) for more information before applying!**

## GOALS:

Allow trainees to:

- Have a general overview of proteomics
- Have a working knowledge of the critical components of basic proteomics workflows
- Become familiar with the advanced liquid chromatography/mass spectrometry (LC/MS) instrumentation used for proteomics via hands-on experience
- Understand how proteomics technology can potentially be applied to problems in biological/medical sciences
- Be involved in a small method development project
- Gain work and management experience in a core facility environment that closely resembles “real world” laboratories in academia and industry

## STRUCTURE:

Interns will work closely with VBRN Proteomics Facility personnel on:

1. proteomics “boot camp” project involving protein identification and quantification ( labs and lectures); followed by
2. a method development pilot project (guided by Wai Lam) **(at least 1 year of commitment)** or
3. a collaborative project with UVM/external investigators (work with facility personnel)

## TIME and LOCATION:

Time

- **Regular Internship:** On an individual basis (a minimum of **80** hours/semester is required) (1 credit = 40 hours)  
For method development project (**200 - 240** hours commitment/year)  
For rising seniors, a summer internship is required for joining the following fall semester
- **Summer Internship:** (8 - 10 weeks: **200 - 350** hours: **25 - 35** hours/week)

Location

- Data Analysis and mini-lectures: (Data Processing Area, VBRN Proteomics Facility, FMRB 143)
- Experimental: (VBRN Proteomics Facility, FMRB 143)

## Semester Schedule (Summer internship will be a combination of 2 semesters of training)

### 1<sup>st</sup> Semester

#### Training

(80 h commitment)

- Proteomics “boot camp” project: protein identification and quantification
- Brief overview of proteomics
- Overview of LCMS Instrumentation and operations/trouble shooting
- Overview of various protein identification approaches
- Overview of different protein quantification and data analysis strategies

### 2<sup>nd</sup> Semester

#### Project-based training

- Establishing new proteomics methods or
- Improving existing methods or
- Participating in Facility users' projects

**-Students can register for internship/research credits -  
-CAS students can apply for summer internship funding-  
-Vermont college students can apply through VBRN-**

**Apply @:**  
<https://vbrn.org/proteomics-internship/>  
**Further Info @**  
<https://ylam.w3.uvm.edu/Internship/>