


## MEMORANDUM

TO: VSCS Board of Trustees

FROM: Sophie Zdatny, Chancellor 

DATE: September 14, 2022

SUBJECT: Board of Trustees' Retreat and Meeting on September 18-19, 2023

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Trustees:

The materials for the upcoming Board Retreat at Lake Morey Resort in Fairlee, Vermont are now available. The meetings will be held in person in the Waterlot Room.

As shown on the attached agenda, the Board retreat will kick off at 9:00 a.m. on Monday, with the first of three sessions. The three sessions are:

- VTSU Master Facilities Planning
- Workforce Development Redesign and Update
- VTSU Strategic Plan for Admissions, Student Success Update, and Optimization 2.0

In addition, the Board will go into executive session for a portion of the first session on VTSU Master Facilities Planning, for two interviews with candidates for the Interim Presidency of Vermont State University, and for a Board development/self-evaluation exercise facilitated by James Page.

Tuesday's agenda begins at 9:00 a.m. with four sessions in the morning as follows:

- Strategic Planning for CCV and VTSU
- Shared Services – Human Resources and Finance Update
- Shared Services – Systems Projects and ERP Replacement
- Trustees' Fiduciary Duties and Conflicts of Interest

The Board will hold a regular Board meeting on Tuesday, commencing at 1:00 p.m. Following public comment and approval of the minutes, there will be several action items for which approval is sought.

The Board will go into executive session to discuss contracts, labor relations agreements with employees, confidential attorney-client communications, and personnel matters. The Board is

expected to take action upon exiting the executive session. Following any additional business, the meeting will adjourn.

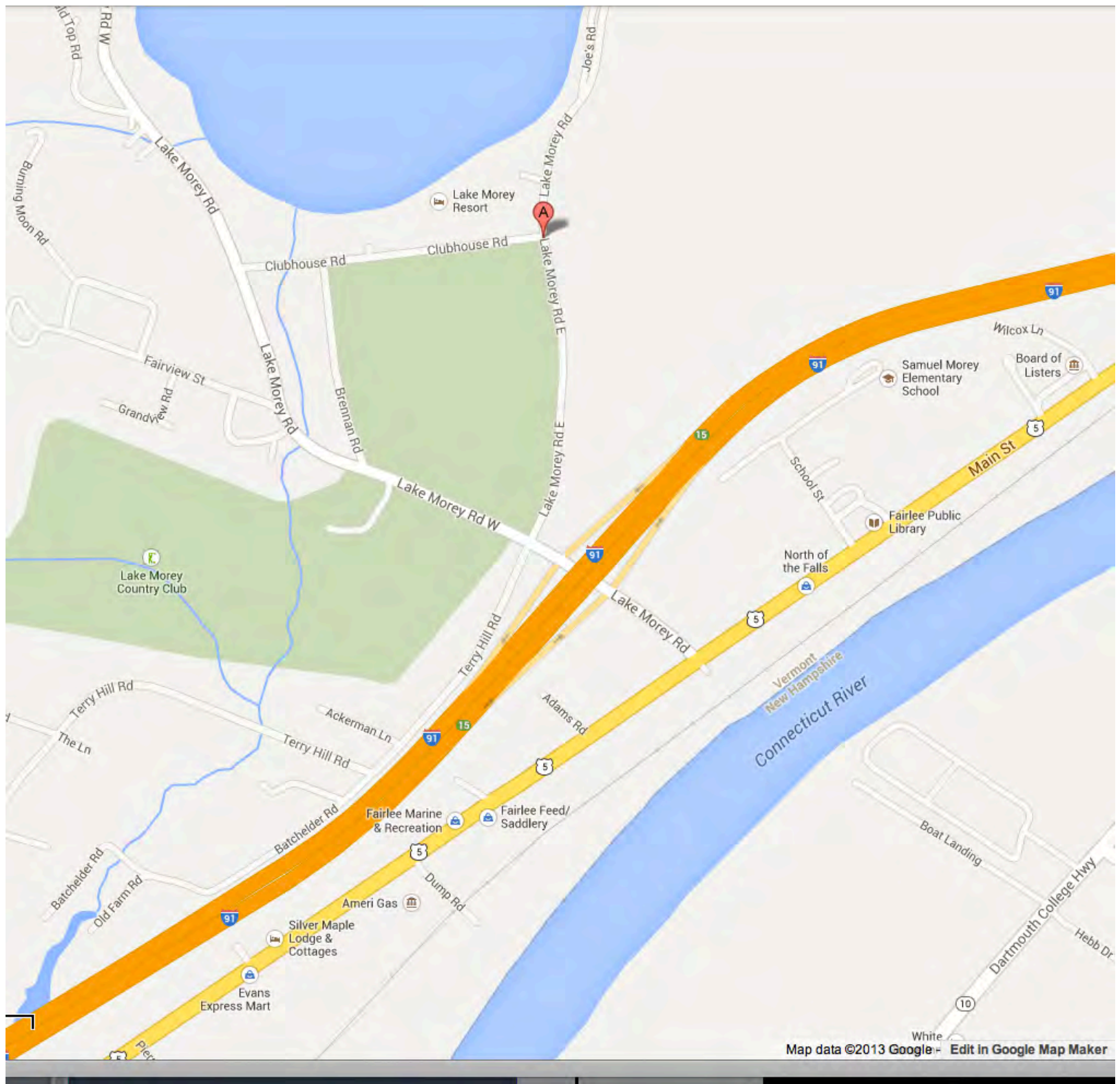
Cc: Council of Presidents  
Academic Deans  
Business Affairs Council  
Student Affairs Council

### Directions to Lake Morey Resort:

From points South: Take I-91 North to Exit 15. Turn left off exit ramp. Take first right (granite Lake Morey Resort sign on corner). Follow the golf course (on left) and take your first left onto Clubhouse Rd. Resort is on the right.

From points North: Take I-89 South to Exit 7 (Berlin/Barre). Take Route 302 East through Barre to Orange. Take Route 25 South to Bradford. Take I-91 South to Exit 15 - Turn right off exit ramp. Take next right (granite Lake Morey Resort sign on corner). Follow the golf course (on left) and take your first left onto Clubhouse Rd. Resort is on the right.

Follow this link to an interactive map: <http://goo.gl/maps/zyZ7y>. Another map is included on the next page. Information about the resort can be found here: <http://www.lakemoreyresort.com>.





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# Vermont State Colleges Board of Trustees Meeting



September 18-19, 2023

*Lake Morey Resort  
Fairlee, VT*

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## **BOARD OF TRUSTEES**

**Lynn Dickinson, Chair**

(2/28/24)

**Janette Bombardier**

(2/28/25)

**Megan Cluver, Vice Chair**

(2/28/27)

**Rep. David Durfee**

(2/28/26))

**Bob Flint**

(2/28/27)

**Shirley Jefferson**

(2/28/25)

**Rep. Bill Lippert**

(2/28/24)

**Karen Luneau, Secretary**

(2/28/25)

**Jim Masland**

(2/28/26)

**Vacancy**

(2/28/27)

**Perry Ragouzis**

5/30/24

**David Silverman, Treasurer**

(2/28/26)

**Shawn Tester**

(2/28/25)

**Sue Zeller**

(2/28/25)

**Governor Phil Scott**

(*ex officio*)

## **Board Committees**

### **Audit**

Sue Zeller, Chair

David Durfee, Vice-Chair

David Silverman

Shawn Tester

vacancy

### **Education, Personnel & Student Life**

Megan Cluver, Chair

Karen Luneau, Vice Chair

Janette Bombardier

Shirley Jefferson

Jim Masland

Perry Ragouzis

vacancy

### **Executive**

Lynn Dickinson, Chair

Megan Cluver, VC

Karen Luneau, Secretary

David Silverman, Treas.

### **Finance & Facilities**

David Silverman, Chair

Shawn Tester, Vice Chair

Lynn Dickinson

David Durfee

Bob Flint

Bill Lippert

Sue Zeller

### **DEI**

Shirley Jefferson, Chair

Bill Lippert, Vice Chair

Megan Cluver

Bob Flint

Jim Masland

Perry Ragouzis

### **Nominating**

Janette Bombardier, Chair

Lynn Dickinson

Bill Lippert

### **Investment Sub-Com**

David Silverman, Chair

David Durfee

Sue Zeller

## **VSC Chancellor's Office**

**Sophie Zdatny, Chancellor**

Chief Information Officer

Director of Transformation Projects

Director of External & Governmental Affairs

Administrative Director

Chief Human Resources Officer

Associate General Counsel

Chief Financial and Operating Officer

General Counsel

**Kellie Campbell**

**Wilson Garland**

**Katherine Levasseur**

**Jen Porrier**

**Sarah Potter**

**Kathryn Santiago**

**Sharron Scott**

**Patty Turley**

**Vermont State Colleges Board of Trustees Retreat**  
**Monday, September 18, 2023**  
**Waterlot Room, Lake Morey Resort, Fairlee, Vermont**

**Schedule**

8:30-9:00 a.m.	<i>Arrival/Welcome/Breakfast</i>
9:00-10:00 a.m.	First Session – <b>VTSU Master Facilities Planning</b> (includes an executive session)
10:00-10:15 a.m.	<i>Mid-morning break</i>
10:15-11:15 a.m.	Executive Session – <b>Candidate Interview</b>
11:15-11:30 a.m.	<i>Transition time</i>
11:30-12:15 p.m.	Second Session – <b>Workforce Development Redesign and Update</b>
12:15-1:15 p.m.	<i>Lunch – main dining room</i>
1:15-3:15 p.m.	Third Session – <b>VTSU Strategic Plan for Admissions, Student Success Update, and Optimization 2.0</b>
3:15-3:30 p.m.	<i>Afternoon break</i>
3:30-4:30 p.m.	Executive Session – <b>Candidate Interview</b>
4:30-4:45 p.m.	<i>Transition time</i>
4:45-5:45 p.m.	Executive Session – <b>Board Development/self-evaluation</b> facilitated by James Page
6:30 p.m.	<i>Dinner – main dining room</i>

**Vermont State Colleges Board of Trustees Retreat  
Tuesday, September 19, 2023  
Waterlot Room, Lake Morey Resort, Fairlee, Vermont**

**Schedule**

8:30-9:00 a.m.	<i>Breakfast</i>
9:00-10:00 a.m.	First Session – <b>Strategic Planning for CCV and VTSU</b>
10:00-10:30 a.m.	Second Session – <b>Shared Services – Human Resources and Finance Update</b>
10:30-10:45 a.m.	<i>Mid-morning break</i>
10:45-11:45 a.m.	Third Session – <b>Shared Services – Systems Projects and ERP Replacement</b>
11:45-Noon	Fourth Session – <b>Trustees’ Fiduciary Duties and Conflicts of interest</b>
Noon-1:00 p.m.	<i>Lunch – main dining room</i>
1:00 p.m.	<b>REGULAR BOARD MEETING</b>

**Agenda**

1. Call to order
2. Public comment
3. Approval of August 14, 2023 Meeting Minutes
4. Items for Board Action
  - a. Motion/vote on VTSU’s Optimization 2.0
  - b. Motion/vote on revisions to VSC policy 311, *Non-discrimination and Prevention of Harassment and Related Unprofessional Conduct*
  - c. Motion/vote on VSC Board Policy 435, *Financial Conflict of Interest in Research*
  - d. Motion/vote on approving Claire Duke Endowment
  - e. Motion/vote on accepting Department of Army Contract
5. Executive session – action is expected to be taken upon exiting executive session
6. Additional Business
7. Adjourn



## MEETING MATERIALS

- Item 1: August 3, 2022 Meeting Minutes
- Item 2: VSC Policy 311, *Non-discrimination and Prevention of Harassment and Related Unprofessional Conduct*
- Item 3: VSC Policy 435; *Financial Conflict of Interest*
- Item 4: Claire Duke Endowment Materials
- Item 5: Department of Army Contract Materials

ITEM 1:  
August 14, 2023 Meeting Minutes

**Minutes of the VSCS Board of Trustees Meeting held Monday, August 14, 2023, at 2:30 p.m. via Zoom – APPROVED**

The Vermont State Colleges Board of Trustees met on Monday, August 14, 2023, via Zoom

Board members present: Lynn Dickinson, Janette Bombardier, Megan Cluver, David Durfee, Bob Flint, Shirley Jefferson, Bill Lippert, Karen Luneau, Jim Masland, Perry Ragouzis, Shawn Tester, Sue Zeller

Absent: Mary Moran, David Silverman

Presidents: Joyce Judy, Mike Smith (Interim)

Chancellor's Office Staff: Wilson Garland, Director, Transformation Projects  
Katherine Levasseur, Director of External and Government Affairs  
Jen Porrier, Administrative Director  
Sophie Zdatny, Chancellor  
Yasmine Ziesler, Special Assistant to the Chancellor

Shared Services: Donny Bazluke, Network/Security Analyst  
Kellie Campbell, Chief Information Officer  
Sarah Chambers, Director, Learning Technologies  
Pat Moulton, Executive Director, Workforce Development  
Sarah Potter, Chief Human Resources Officer  
Kathryn Santiago, Associate General Counsel  
Sharron Scott, Chief Financial/Operations Officer  
Patty Turley, General Counsel  
Meg Walz, Director, Project Management

From the Colleges: Angie Albeck, Associate Dean of Students & Policy 311/Title IX Coordinator, Community College of Vermont  
Nolan Atkins, Vice President of Academic Affairs, Northern Vermont University  
Kelley Beckwith, Vice President of Student Success, Castleton University  
Mary Brodsky, Dean of People and Culture, Community College of Vermont  
Amy Daviarz, Title IX & Protected Rights Coordinator, Vermont State University  
Gretchen DeHart, Senior Director of Engagement & Academic Centers, Community College of Vermont  
Marianne DiMascio, Senior Director of Engagement & Academic Centers, Community College of Vermont

Jenney Izzo, Regional Director of Academic Centers & Community Engagement, Community College of Vermont  
Katie Mobley, Dean of Enrollment & Community Relations, Community College of Vermont  
Nicole Mace, Dean of Administration, Community College of Vermont  
Amy Miller, VSCUP Co-President, Vermont State University  
Maurice Ouimet, Vice President of Admissions, Castleton University  
Debby Stewart, Dean of Academic Affairs, Community College of Vermont  
Littleton Tyler, Assistant Vice President, Finance & Compliance, Vermont State University  
Tiffany Walker, Senior Director of Workforce Education, Community College of Vermont  
Heather Weinstein, Dean of Strategic Initiatives & Student Affairs, Community College of Vermont

1. Chair Dickinson called the meeting to order at 2:45 p.m.
2. Comments from the public

Amy Miller introduced herself to the Board as co-chair of VSC United Professionals, with Beth Walsh.

3. Approval of Minutes
  - a. June 12, 2023
  - b. July 7, 2023

**Trustee Zeller moved and Trustee Jefferson seconded the motion to approve the June 12, 2023 minutes, and the July 7, 2023 minutes. The motion was approved unanimously.**

4. Annual Board Trainings:
  - a. VSC Policy 311, *Non-discrimination and Prevention of Harassment and Related Unprofessional Conduct*
  - b. VSC Policy 311-A, *Sexual Harassment, Sexual Exploitation, Domestic Violence, Dating Violence, Sexual Assault, and Stalking*
  - c. VSC Policy 316, *Protection of Minors and Mandatory Reporting of Child Abuse and Neglect*

Chair Dickinson introduced Angie Albeck, Associate Dean of Students and Policy 311/Title IX Coordinator for CCV, and Amy Daviarz, Title IX and Protected Rights Coordinator for Vermont State University. Together, they presented a training on VSC Policies 311, 311A and 316. The presentation can be found [here](#). Associate General Counsel Kathryn Santiago provided

information on the VSC formal complaint process, including data on reports made over the past three years.

5. Report from Ad Hoc Search Committee for an Interim President of Vermont State University

Chair Dickinson provided a report on behalf of the Ad Hoc Search Committee, which was created by the Board at the Annual meeting on June 12<sup>th</sup>. The committee has met four times so far with another three meetings scheduled over the next month. The Board is seeking an interim President for a term of approximately 18-24 months and expects to conduct a full, traditional search for a permanent President during the 2024-2025 academic year. The committee has asked the Chancellor to work with AGB Interim Search to identify 2-3 qualified candidates, in addition to the nominations and recommendations of potential candidates already being explored by the committee. The committee has collected feedback on the “Qualifications and Characteristics” section of the Presidential Portfolio that was developed for the previous Presidential search. A revised draft of the desired “Qualifications and Competencies” for the interim President has been prepared for the committee’s consideration at its upcoming August 17<sup>th</sup> meeting. The committee will be working with the search firm to identify ways to incorporate additional voices into the selection process once final candidates have been identified.

6. Reports from the Presidents

VTSU President Mike Smith reported on the progress of his three main goals: reducing turmoil, obtaining accreditation, and beginning the process of financial stability. Having accomplished the first two goals, he is currently focused on the third, which he intends to achieve through class size optimization and program alignment. His goal is to have a recommendation to faculty for their consideration by October 1<sup>st</sup>. He acknowledged that it will likely take several years to implement Optimization 2.0 of academic programs. President Smith spoke of expanding the Nursing capabilities and programs, particularly on the Johnson campus, using the \$6.3 million nursing infrastructure grant. Vermont State University is developing a strategic plan for admissions that recognizes the different skillset needed to recruit traditional and non-traditional students. He intends to bring the strategic plan to the Board once it has been finalized. President Smith discussed the University workforce development plans and some anticipated restructuring to reduce the amount of bureaucracy. Finally, he shared information about a housing pilot on the Randolph campus in which part-time students can reside in housing, including those taking a single class. The pilot seeks to attract some of 45% of Vermont high school graduates who do not typically go onto college by encouraging them to move out of the family home and experience college, with the hope they will continue their education.

CCV President Joyce Judy reported that CCV is firing on all cylinders. She noted how closely CCV and VTSU are working together on the Respiratory Therapy program. She also referenced an employer partnership with Southwestern Vermont Medical Center, in which the employer helps to support the upskilling of its employees. President Judy also shared information about a resolution the Board passed in 2021 involving a boundary adjustment for the CCV Winooski property. The adjustment has now been made, by which a small piece of land has been conveyed to the city in exchange for a significant discount on parking. President Judy further shared some information regarding the significant uptick in the number of students taking advantage of Early College – they come from 47 high schools in Vermont and represent 13 of the 14 counties.

There is also a significant representation of first-generation students and BIPOC students. President Judy will provide a full enrollment report at the September retreat.

7. Executive Session

**At 4:22 p.m. Trustee Dickinson moved that the VSCS Board of Trustees enter executive session pursuant to 1 VSA 313(a)(1)(F) to receive confidential attorney-client communications because premature general public knowledge would clearly place the public body involved at a substantial disadvantage; and 1 VSA 313(a)(3) to discuss the appointment and employment of public officers. Along with members of the Board present at the meeting, the Board invited the Chancellor, the General Counsel, and the Chief Information Officer to attend the executive session. Trustee Lippert seconded the motion and it was approved unanimously.**

The Board exited executive session at 5:02 p.m. and took no action.

8. Additional Business

There was no other business.

Chair Dickinson adjourned the meeting at 5:03 p.m.

ITEM 2:

VSC Policy 311, *Non-discrimination and Prevention of Harassment and Related Unprofessional Conduct*



<b>NON-DISCRIMINATION AND PREVENTION OF HARASSMENT AND RELATED UNPROFESSIONAL CONDUCT</b>	Number 311	Page 1 of 12
	Date <del>8/12/20</del> <u>9/19/23</u>	

**I. NOTICE OF NONDISCRIMINATION**

The Vermont State Colleges and its member ~~Colleges~~ Institutions prohibit discrimination and harassment on the basis of a person’s race, color, ancestry, ethnicity, national origin, place of birth, sex, sexual orientation, gender identity, creed, religion, disability, age, veteran status, marital status, genetic information, positive HIV-related blood test results, or any other status protected by state or federal law, pursuant to Title IX of the Education Amendments, the Equal Pay Act, the Age Discrimination in Employment Act, the Older Workers Benefit Protection Act, Section 504 of the Rehabilitation Act, the Vietnam Era Veterans Readjustment Assistance Act, the Uniformed Services Employment and Reemployment Rights Act, Title VI and Title VII of the Civil Rights Act, the Genetic Information Nondiscrimination Act, the Americans with Disabilities Act, Vermont’s State Employees Labor Relations Act, Vermont’s Public Accommodations Act, Vermont’s statutory provisions on harassment applicable to postsecondary schools, Vermont’s statutory provisions relating to HIV-discrimination and testing, Vermont’s Fair Employment Practices Act, and any other applicable state or federal non-discrimination and harassment prevention law, regulation, or policy.

As a recipient of federal funds, the Vermont State Colleges and each member ~~College~~ Institution of the Vermont State Colleges is required to comply with Title IX of the Education Amendments of 1972 (“Title IX”). In accordance with Title IX, as well as other applicable state and federal law, the VSC and its member ~~Colleges~~ Institutions prohibit discrimination on the basis of sex in its education programs and activities, admission, and employment. Sexual harassment, which includes acts of sexual violence, is a form of sex discrimination prohibited by Title IX. Title IX also prohibits gender-based harassment, which may include acts of verbal, non-verbal, or physical aggression, intimidation, or hostility based on sex or sex-stereotyping, even if those acts do not involve acts of a sexual nature.

Inquiries concerning the application of Title IX may be referred to the VSC’s Title IX Coordinators or to the United States Department of Education for the Office of Civil Rights. Inquiries concerning discrimination on the basis of other protected categories may be referred to the VSC’s Policy 311 Coordinators, the Vermont Human Rights Commission, the Vermont Attorney General’s Office – Civil Rights Unit, or to the Equal Employment Opportunity



Commission. Contact information for the Coordinators is located in Appendix A and contact information for these state and federal agencies is located in Appendix C to the *Chancellor's Procedures for Implementation of Policy 311: Non-Discrimination and Prevention of Harassment and Related Unprofessional Conduct*.

## II. POLICY STATEMENT

The Vermont State Colleges and its member Colleges-Institutions (collectively the "VSC") are committed to maintaining an educational and working environment free from discrimination, harassment and related unprofessional conduct. The VSC prohibits discrimination on the basis of a person's race, color, ancestry, ethnicity, national origin, place of birth, sex, sexual orientation, gender identity, creed, religion, disability, age, veteran status, marital status, genetic information, positive HIV-related blood test results, or any other status protected by state or federal law (collectively "protected categories"). Sexual harassment, racial harassment, and harassment based upon a person's status in a protected category are forms of discrimination and will not be tolerated. In addition, inappropriate sexual relationships between VSC employees and students, including those that may not otherwise rise to the level of sexual harassment, are prohibited.

## III. POLICY COVERAGE

In accordance with Title IX, as well as applicable state and federal law, neither the VSC nor any member College-Institution shall discriminate on the basis of the above-listed protected categories in the application processes for admissions or employment, in academic and residential programs, in employment policies and practices, in scholarship and loan programs, in athletic programs, or in any other academic, extra-curricular or VSC-sponsored programs, activities, or facilities. The prohibitions set forth in this Policy also apply to all members of the VSC community, including students, employees, and third parties who come on to campus (such as parents, visitors, independent contractors, and vendors). This Policy covers conduct that occurs off-campus, or through the use of online, electronic or digital technologies, and that has a reasonable nexus to any VSC education program or activity, for example by creating a hostile environment on campus or representing a threat to the safety of members of the VSC community or to the continuance of normal VSC operations.<sup>1</sup>

## IV. POLICY INTENT AND OVERVIEW

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<sup>1</sup> Policy 311 and the Chancellor's Implementing Procedures apply to reports of sexual harassment that do not fall within the scope of Title IX Sexual Harassment or Non-Title IX Prohibited Conduct as defined in Policy 311-A and the accompanying Chancellor's Procedures for Implementation of Policy 311-A.

This Policy is intended to be read consistently with, and unless otherwise expressly stated, no broader than, Vermont and federal non-discrimination and harassment prevention laws, regulations and policies. Laws prohibiting discrimination and harassment are many and varied at both the state and federal level and apply with some differing standards and consequences to employees, students and visitors. Because harassment is a form of discrimination, it is the intent of the VSC to address all prohibitions related to non-discrimination and prevention of harassment under one comprehensive policy for ease of access and use, consistent with federal law. Certain acts of sexual harassment (including, but not limited to, sexual assault and sexual exploitation), domestic violence, dating violence, and stalking are addressed separately in VSC Policy 311-A, *Sexual Harassment, Sexual Exploitation, Domestic Violence, Dating Violence, Sexual Assault and Stalking*. Sexually harassing behavior that is deemed to meet the definitions of Title IX Sexual Harassment or Non-Title IX Prohibited Conduct under Policy 311-A and the accompanying Chancellor's Procedures for Implementation of Policy 311-A must be addressed under Policy 311-A.

## V. DEFINITIONS

For the purposes of this Policy, unless the context clearly requires otherwise, the following definitions apply. The specific definitions contained in an employee benefit plan will control with respect to any claim arising out of that plan.

### A. **Discrimination**

“Discrimination” means the unlawful refusal of, withholding from, exclusion from participation in, or denial of any accommodations, advantages, benefits, facilities, privileges, pay, or services of the VSC or its member Colleges-Institutions on the basis of a person’s race, color, ancestry, ethnicity, national origin, place of birth, sex, sexual orientation, gender identity, creed, religion, disability, age, veteran status, marital status, genetic information, positive HIV-related blood test results, or any other status protected by state or federal law.

### B. **Harassment**

Under Vermont law, “harassment” means an incident or incidents of verbal, written, visual, or physical conduct or communication, including any incident conducted by electronic means, based on or motivated by a person's or person’s family member’s, actual or perceived race, color, ancestry, ethnicity, national origin, place of birth, sex, sexual orientation, gender identity, creed, religion, crime victim status, disability, age, veteran status, marital status, genetic information, HIV-positive blood test results, physical or mental condition or any other status protected by state or federal law that has the purpose or effect of objectively and substantially undermining and detracting from or interfering with a student’s educational performance or access to school resources or the effect of objectively undermining and detracting from or interfering with an

employee's performance work, or creating an objectively intimidating, hostile, or offensive environment.

Harassment includes the use of epithets, stereotypes, slurs, comments, insults, derogatory remarks, gestures, threats, graffiti, display, or circulation of written or visual material, and taunts on manner of speech and negative references to customs related to any of the protected categories.

### C. Sexual Harassment

“Sexual harassment” is unwelcome conduct of a sexual nature and it includes *quid pro quo* sexual harassment and hostile environment sexual harassment. Sexual harassment includes physical conduct of a sexual nature, such as sexual assault or other acts of sexual violence. Sexual harassment under Title IX, including sexual assault, is addressed separately in VSC Policy 311-A, *Sexual Harassment, Sexual Exploitation, Domestic Violence, Dating Violence, Sexual Assault and Stalking*. Where conduct is not deemed to meet the definitions of Title IX Sexual Harassment or Non-Title IX Prohibited Conduct under Policy 311-A, the following definitions apply:

- “*Quid pro quo* sexual harassment” generally involves a person in a position of power (such as a supervisor over an employee or a faculty member over a student) pressuring a subordinate employee or a student for sexual favors in exchange for an advancement in the workplace or academically, or under the threat of an adverse employment or academic action being taken. *Quid pro quo* sexual harassment includes situations where, for example, a student or employee is rewarded with a higher grade, a stronger evaluation, or an opportunity for advancement for granting a request for sexual favors or is punished with a lower grade, a less favorable evaluation, or denial of an educational or workplace opportunity for refusing to grant a request for sexual favors. In either case, a person uses the position of power as leverage to pressure another person into complying with a request for sexual favors.
- “Non-employee” ~~“h~~Hostile environment sexual harassment” is sexual harassment of a person who is not an employee that creates a hostile ~~employment or~~ educational environment and it is a form of sex discrimination. Examples of sexually harassing behavior that could create a hostile environment under appropriate circumstances include the following where the particular behavior is unwelcome to the person to whom it is directed:
  - Sexual advances, including requests for sexual favors and repeated requests for dates;
  - Intentional unwanted or offensive touching, including fondling;
  - Indecent exposure;
  - Sexually-derogatory comments, including sexually explicit comments, sexually suggestive innuendoes, sexually offensive jokes, and sexual taunts;
  - Obscene or offensive gestures;

- Images and depictions of a sexual nature, including sexually derogatory or sexually suggestive pin-ups, posters, cartoons, and calendars; and
- Writings of a sexually derogatory or suggestive nature.

This list is not exhaustive and other unwelcome behavior of a sexual nature, if it is severe and pervasive enough, may constitute sexual harassment. *See* Section E, Hostile Environment, below for further elaboration.

- “~~2~~Employee hostile environment sexual harassment” is sexual harassment of an employee that meets the above definition of as defined in “Non-employee hostile environment sexual harassment” above except that the unwelcome behavior of a sexual nature creates a hostile employment environment and it need not be severe or pervasive in order to constitute sexual harassment.

Conduct is “**unwelcome**” if the person subjected to the alleged sexually harassing behavior did not request or invite it and regards the conduct as undesirable or offensive. The fact that a person willingly participated in conduct on one occasion does not prevent that person from indicating that the same or similar conduct has become unwelcome on a subsequent occasion. ~~If a person actively participates in the conduct, such as sexual banter, without objection, the conduct would not be considered unwelcome.~~

Sexual harassment may be committed by a stranger, an acquaintance, a colleague, a co-worker, a student, or someone with whom the subject of the harassment has a social, romantic or intimate relationship. Sexual harassment may be committed by or against any individual, regardless of gender, sexual orientation, or gender identity.

## **1. Sexual Harassment of a Student**

Under Vermont law, “sexual harassment of a student” means:

- (a) An incident or incidents of verbal, written, visual, or physical conduct or communication, including any incident conducted by electronic means, based on or motivated by the student’s sex, that has the purpose or effect of objectively and substantially undermining and detracting from or interfering with a student's educational performance or access to school resources or creating an objectively intimidating, hostile, or offensive environment; or
- (b) Unwelcome sexual advances, requests for sexual favors and other verbal, written, visual, or physical conduct of a sexual nature when one or both of the following occur:
  - (1) Submission to that conduct is made either explicitly or implicitly a term or condition of a student's education.

- (2) Submission to or rejection of such conduct by a student is used as a component of the basis for decisions affecting that student.

## 2. Sexual Harassment of an Employee

Under Vermont law, “sexual harassment of an employee” means unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature when:

- (a) Submission to that conduct is made either explicitly or implicitly a term or condition of employment; or
- (b) Submission to or rejection of such conduct by an individual is used as a component of the basis for employment decisions affecting that individual; or
- (c) The conduct has the purpose or effect of objectively ~~and substantially~~ interfering with an individual's work ~~performance~~ or creating an objectively intimidating, hostile or offensive work environment.

## D. Related Unprofessional Conduct

“Related unprofessional conduct” on the part of a VSC employee means the initiation of or participation in an amorous or sexual relationship with a VSC student when the employee is, or may reasonably be perceived to be, in a position of power and authority over the student, even if the conduct does not otherwise constitute sexual harassment. Examples include, but are not limited to, situations where the VSC employee is an administrator, instructor, coach, advisor, work study supervisor or counselor for the student, or a member of a committee having responsibility for decisions that affect students.

## E. Hostile Environment

● A “non-employee hostile ~~work or~~ educational environment” is one in which the alleged conduct is sufficiently serious as to limit or deny the ability of the person subjected to the harassment to participate in or benefit from the ~~employment or~~ educational environment. The severity and pervasiveness of the alleged harassing conduct is evaluated using common sense and reasonable judgment to determine whether it created an intimidating, hostile or offensive environment. The determination is made from the perspective of a reasonable person, in the position of the person subjected to the alleged harassment, considering all of the relevant circumstances. Factors that may be considered include:

- The degree to which the conduct affected the student’s education ~~or the employee’s~~ **employment;**

- The type(s) of harassment (for example, whether it was verbal and/or physical);
- The frequency and duration of the harassing conduct;
- The identity of, and relationship between, the alleged harasser and the subject of the harassment;
- The number of individuals engaged in the harassing conduct (for example, a group of students targeting a single student); and
- The setting(s) and context(s) in which the harassing conduct occurred.

Generally, the more severe the conduct, the less need there is to show a repetitive series of incidents to establish a hostile environment, particularly if the harassment was physical. Harassing conduct may violate this Policy if, for multiple instances of conduct, it is so pervasive that when viewed from an objective standard of a similarly-situated reasonable person, it substantially and adversely affected the targeted student's ~~or employee's~~ educational ~~or employment~~ opportunities or benefits. A single incident of harassing conduct may violate this Policy if the conduct is so severe that, when viewed from an objective standard of a similarly-situated reasonable person, it substantially and adversely affected the targeted student's ~~or employee's~~ equal access to educational ~~or employment~~ opportunities or benefits.

• An "employee hostile work environment" is one in which the alleged conduct is sufficiently serious as to limit or deny the ability of the employee ~~person~~ subjected to the harassment to participate in or benefit from the employment environment. The seriousness of the alleged harassing conduct is evaluated using common sense and reasonable judgment to determine whether it created an intimidating, hostile or offensive environment. The determination is made from the perspective of a reasonable person, in the position of the person subjected to the alleged harassment, considering all of the relevant circumstances. Factors that may be considered include:

- The degree to which the conduct affected the employee's work ~~education~~;
- The type(s) of harassment (for example, whether it was verbal and/or physical);
- The frequency and duration of the harassing conduct;
- The identity of, and relationship between, the alleged harasser and the subject of the harassment;
- The number of individuals engaged in the harassing conduct (for example, a group of employees targeting a single employee); and
- The setting(s) and context(s) in which the harassing conduct occurred.

Harassing conduct may violate this Policy if, it is sufficiently serious that when viewed from an objective standard of a similarly-situated reasonable person, it adversely affected the targeted employee's employment opportunities or benefits. Behavior that a reasonable employee with the same protected characteristic would consider to be a petty slight or trivial inconvenience shall not constitute unlawful harassment or discrimination.

## **F. Retaliation**

“Retaliation” against any person for reporting a violation of this Policy, for filing a complaint pursuant to this Policy, or for cooperating in an investigation under this Policy includes, but is not limited to: (1) pressuring a person to drop or not support a complaint; (2) encouraging a person to provide false or misleading information; (3) engaging in conduct that may reasonably be perceived to affect adversely that person’s educational, living or work environment; (4) threatening, intimidating or coercing the person; or (5) otherwise discriminating against any person for exercising their rights and responsibilities under this Policy.

## **VI. FREEDOM OF SPEECH**

The VSC recognizes that the protection of free and open speech and the open exchange of ideas are essential to any academic or artistic community, and crucial for the activity of scholars and artists. The VSC also recognizes its obligation under policy and collective bargaining agreements to respect the academic freedom of faculty members. This Policy is meant neither to proscribe nor to inhibit discussions, in or out of the classroom, of complex, controversial, or sensitive matters, including race, color, ancestry, ethnicity, national origin, place of birth, sex, sexual orientation, gender identity, creed, religion, disability, age, veteran status, marital status, genetic information, or HIV-positive status, when in the judgment of a reasonable person such discussions arise appropriately and with respect for the dignity of others. The VSC is a community of learners and as such recognizes and affirms that free, honest intellectual inquiry, debate, and constructive dialogue are vital to the academic mission of the VSC and must be protected even when the views expressed are unpopular or controversial.

The VSC also recognizes, however, that verbal conduct can be used specifically to intimidate or coerce and to inhibit genuine discourse, free inquiry, and learning. Such abuses are unacceptable. If someone believes that another's speech or writing is offensive, wrong, or hurtful, he or she is encouraged to express that judgment in the exercise of his or her own freedom of speech or to seek redress when appropriate.

## **VII. PROHIBITIONS**

### **A. Discrimination and Harassment**

All members of the VSC community are expressly prohibited from:

- (1) Discriminating against a student or employee on the basis of a protected category;
- (2) Harassing a student or employee on the basis of a protected category; or

(3) Sexually harassing a student or employee.

## **B. Related Unprofessional Conduct**

Employees of the VSC are expressly prohibited from engaging in related unprofessional conduct with students.

## **C. HIV-related Blood Test**

Under Vermont law, it is unlawful for the VSC or any member ~~Institution~~College to request or require any applicant, prospective student, or current student to have an HIV-related blood test or to discriminate against an applicant, prospective student, or current student on the basis of a person's having a positive test result from an HIV-related blood test.

Under Vermont law, it is unlawful for employers and labor organizations to discriminate against, indicate a preference or limitation, refuse properly to classify or refer, or to limit or segregate membership on the basis of a person's having a positive test result from an HIV-related blood test or to require an applicant, prospective employee, employee, prospective member, or member to have an HIV-related blood test as a condition of employment or membership, classification, placement, or referral.

## **D. Retaliation**

Retaliation against any person for reporting a violation of this Policy, filing a complaint, or cooperating with an investigation into an alleged violation of this Policy is prohibited and will be considered a violation of this Policy. Retaliation under this Policy may be found whether or not the underlying complaint is ultimately found to have merit. A complaint of retaliation should be reported, and will be investigated and adjudicated, using the procedures implementing this Policy.

## **E. False Information**

Providing false information in connection with a complaint under this Policy or intentionally misleading officials in the investigation or resolution of such a complaint is prohibited and may result in disciplinary action.

## **VIII. DUTY TO COOPERATE**



All students and employees have a duty to cooperate in investigations undertaken pursuant to this Policy and are expected to provide complete, accurate, and truthful information. They may be asked to sign statements or other documents memorializing the information they provide, and may be asked to keep the substance of any interview confidential, to the extent permitted by law. Failure to cooperate fully with an investigation may subject the individual to the full range of disciplinary actions, up to and including expulsion or termination.

All actions taken to investigate and resolve complaints through this procedure shall be conducted with as much privacy, discretion and confidentiality as possible without compromising the thoroughness and fairness of the investigation. All persons involved are expected to treat the situation under investigation with respect. To conduct a thorough investigation, the investigator(s) may discuss the complaint with witnesses and those persons involved in or affected by the complaint, and those persons necessary to assist in the investigation or to implement appropriate disciplinary actions. Nothing herein shall be deemed to limit the procedural rights of unionized and other employees with regard to such investigations.

## **IX. SANCTIONS**

Violation of the prohibitions set forth in this Policy is grounds for discipline up to and including the dismissal/expulsion of students or the termination of employees. Generally, the range of sanctions for **students** includes verbal and written warnings, written reprimands, counseling, loss of privileges, probationary status, removal from InstitutionCollege housing, suspension, dismissal/expulsion, revocation of degree, and/or withholding of transcript or other action determined to be appropriate under the circumstances. Generally, the range of sanctions for **employees** includes verbal warnings, written warnings, written reprimands, probation, suspension, termination of employment, non-renewal of a contract, or other action determined to be appropriate under the circumstances.

The VSC may also impose certain non-disciplinary remedial actions where appropriate, such as required counseling or training for the respondent and/or a group of students or employees, to stop the misconduct, prevent its recurrence, and remedy its effects. Additional non-disciplinary outcomes, such as extending and modifying no contact orders, room changes, class changes, work schedule changes, building restrictions, and extracurricular activity restrictions may also be imposed, regardless of the finding, to maintain an environment free from discrimination and harassment.

Conduct that violates this Policy may also be unlawful and expose a person engaging in such conduct to civil and/or criminal sanctions.

Misconduct that does not violate this Policy may violate other VSC policies, student handbooks, codes of conduct, or collective bargaining agreements and, if so, shall be handled as set forth in such other documents.

## X. PROCEDURES

The Chancellor shall establish and periodically update the procedures for handling complaints alleging violations of this Policy and for developing educational programs designed to prevent such conduct. Such procedures shall be consistent with Vermont and federal legal requirements and any collective bargaining agreements governing the rights and responsibilities of the VSC, its member Colleges-Institutions and employees. The procedures shall ensure that the VSC and any member Institution College, upon receiving notice of conduct that allegedly violates this Policy, promptly and impartially investigates such complaints and, where complaints are substantiated, takes prompt and appropriate remedial action reasonably calculated to stop the misconduct, prevent its recurrence, and remedy its effects, if necessary.

The procedures established by the Chancellor may be modified as necessary to comply with federal and state law and to ensure that complaints of discrimination and harassment are promptly and impartially investigated and adjudicated.

Students who have concerns about perceived discrimination, harassment, related unprofessional conduct, or retaliation are encouraged to report their concerns as soon as possible. Employees who learn of an incident of discrimination, harassment, related unprofessional conduct, or retaliation are required to report this information as soon as possible, as set forth in the accompanying procedures.

The VSC's primary goals in responding to violations of this Policy are to promote the safety of the VSC community, to address discrimination and harassment, and to prevent discrimination and harassment from recurring. Individuals should not be deterred from reporting a violation of this Policy because alcohol, drugs, or violations of other VSC's policies were involved in the incident. VSC officials may, in their discretion and on a case-by-case basis, decide not to pursue relatively minor drug, alcohol, or other policy violations related to alleged violations of this Policy or, if they do pursue such violations, to handle them separately from complaints brought under this Policy.

### A. Standard of Proof

The standard of proof applicable to the investigation and adjudication of complaints under this Policy shall be "by a preponderance of the evidence," meaning that it is more likely than not (*i.e.* there is more than a 50% likelihood) that the alleged actions or behavior in violation of the Policy occurred.


### B. Coordinators

The Chancellor (for the Office of the Chancellor) and the President of each member ~~College~~ Institution (for each Institution~~College~~) shall appoint individuals to coordinate efforts to carry out and comply with: (1) Title IX of the Education Amendments of 1972 and the other federal and state laws prohibiting discrimination and harassment on the basis of a protected category; and (2) Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Contact information for the coordinators shall be attached to the Chancellor’s Procedures.

**XI. POLICY DISTRIBUTION AND EDUCATION**

The ~~Colleges-Institutions~~ and the Office of the Chancellor shall distribute or make available annually copies of the Policy and related procedures for all students and employees. The ~~Colleges-Institutions~~ and the Office of the Chancellor will make available appropriate educational materials and programs to facilitate understanding and implementation of this Policy for all students and employees.

Date adopted by the Board of Trustees: ~~August 12, 2020~~ September 19, 2023

Signed by:  <hr/> Sophie E. Zdatny, Chancellor
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Date	Version	Revision	Approved By
2006	1.0	Adopted	VSCS Board of Trustees
2/19/15	2.0	Updated	VSCS Board of Trustees
8/12/20	3.0	Updated per 2020 Title IX regulations	VSCS Board of Trustees
<u>9/19/23</u>	<u>4.0</u>	<u>Updated per 2023 VT Fair Employment Practices Act</u>	<u>VSCS Board of Trustees</u>

## Relevant Legal Authorities

### Federal

- 20 U.S.C. § 1681 *et seq.*, Title IX of the Education Amendments of 1972
- 34 C.F.R. Part 106 (Title IX regulations)
- 20 U.S.C. § 1232g, Family Educational Rights and Privacy Act of 1974 (FERPA)
- 34 C.F.R. Part 99 (FERPA regulations)
- 29 U.S.C. § 602(d), Equal Pay Act of 1963
- 29 U.S.C. § 621 *et seq.*, Age Discrimination in Employment Act of 1967, as amended by the Older Workers Benefit Protection Act of 1990
- 29 U.S.C. § 701 *et seq.*, Section 504 of the Rehabilitation Act of 1973, as amended
- 38 U.S.C. § 4212, Vietnam Era Veterans Readjustment Assistance Act of 1974, as amended
- 38 U.S.C. § 4301 *et seq.*, Uniformed Services Employment and Reemployment Rights Act of 1994
- 42 U.S.C. § 2000d, Title VI of the Civil Rights Act of 1964
- 42 U.S.C. § 2000e *et seq.*, Title VII of the Civil Rights Act of 1964, as amended by the Pregnancy Discrimination Act of 1978 and the Civil Rights Act of 1991
- 42 U.S.C. § 2000ff-1 *et seq.*, Genetic Information Nondiscrimination Act of 2008
- 42 U.S.C. § 12101 *et seq.*, Americans with Disabilities Act of 1990, as amended by the Americans with Disabilities Amendments Act of 2008

### State

- 3 V.S.A. § 961(6)-(8), State Employees Labor Relations Act
- 9 V.S.A. §§ 4500 *et seq.*, Vermont Public Accommodations Act
- 16 V.S.A. § 11(a)(26), Classifications and Definitions, Harassment
- 16 V.S.A. § 178, Harassment and Hazing Prevention Policies; Postsecondary Schools
- 16 V.S.A. § 570f, Harassment; Notice and Response
- 18 V.S.A. § 1127, HIV Discrimination and Testing
- 21 V.S.A. § 495, Fair Employment Practices Act
- 21 V.S.A. § 495d(5)-(12), Definitions, Disability
- 21 V.S.A. § 495d(13), Definitions, Sexual Harassment
- 21 V.S.A. § 495h, Fair Employment Practices Act – Sexual Harassment

### Cross References

- Chancellor's Procedures for Implementation of Policy 311
- VSC Policy 311-A, *Sexual Harassment, Sexual Exploitation, Domestic Violence, Dating Violence, Sexual Assault and Stalking*
- Chancellor's Procedures for Implementation of Policy 311-A
- VSC Policy 312, *Compliance with the Family Educational Rights and Privacy Act (FERPA)*



<b>NON-DISCRIMINATION AND PREVENTION OF HARASSMENT AND RELATED UNPROFESSIONAL CONDUCT</b>	Number 311	Page 1 of 12
	Date <b>9/19/23</b>	

**I. NOTICE OF NONDISCRIMINATION**

The Vermont State Colleges and its member Institutions prohibit discrimination and harassment on the basis of a person’s race, color, ancestry, ethnicity, national origin, place of birth, sex, sexual orientation, gender identity, creed, religion, disability, age, veteran status, marital status, genetic information, positive HIV-related blood test results, or any other status protected by state or federal law, pursuant to Title IX of the Education Amendments, the Equal Pay Act, the Age Discrimination in Employment Act, the Older Workers Benefit Protection Act, Section 504 of the Rehabilitation Act, the Vietnam Era Veterans Readjustment Assistance Act, the Uniformed Services Employment and Reemployment Rights Act, Title VI and Title VII of the Civil Rights Act, the Genetic Information Nondiscrimination Act, the Americans with Disabilities Act, Vermont’s State Employees Labor Relations Act, Vermont’s Public Accommodations Act, Vermont’s statutory provisions on harassment applicable to postsecondary schools, Vermont’s statutory provisions relating to HIV-discrimination and testing, Vermont’s Fair Employment Practices Act, and any other applicable state or federal non-discrimination and harassment prevention law, regulation, or policy.

As a recipient of federal funds, the Vermont State Colleges and each member Institution of the Vermont State Colleges is required to comply with Title IX of the Education Amendments of 1972 (“Title IX”). In accordance with Title IX, as well as other applicable state and federal law, the VSC and its member Institutions prohibit discrimination on the basis of sex in its education programs and activities, admission, and employment. Sexual harassment, which includes acts of sexual violence, is a form of sex discrimination prohibited by Title IX. Title IX also prohibits gender-based harassment, which may include acts of verbal, non-verbal, or physical aggression, intimidation, or hostility based on sex or sex-stereotyping, even if those acts do not involve acts of a sexual nature.

Inquiries concerning the application of Title IX may be referred to the VSC’s Title IX Coordinators or to the United States Department of Education for the Office of Civil Rights. Inquiries concerning discrimination on the basis of other protected categories may be referred to the VSC’s Policy 311 Coordinators, the Vermont Human Rights Commission, the Vermont Attorney General’s Office – Civil Rights Unit, or to the Equal Employment Opportunity

Commission. Contact information for the Coordinators is located in Appendix A and contact information for these state and federal agencies is located in Appendix C to the *Chancellor's Procedures for Implementation of Policy 311: Non-Discrimination and Prevention of Harassment and Related Unprofessional Conduct*.

## **II. POLICY STATEMENT**

The Vermont State Colleges and its member Institutions (collectively the "VSC") are committed to maintaining an educational and working environment free from discrimination, harassment and related unprofessional conduct. The VSC prohibits discrimination on the basis of a person's race, color, ancestry, ethnicity, national origin, place of birth, sex, sexual orientation, gender identity, creed, religion, disability, age, veteran status, marital status, genetic information, positive HIV-related blood test results, or any other status protected by state or federal law (collectively "protected categories"). Sexual harassment, racial harassment, and harassment based upon a person's status in a protected category are forms of discrimination and will not be tolerated. In addition, inappropriate sexual relationships between VSC employees and students, including those that may not otherwise rise to the level of sexual harassment, are prohibited.

## **III. POLICY COVERAGE**

In accordance with Title IX, as well as applicable state and federal law, neither the VSC nor any member Institution shall discriminate on the basis of the above-listed protected categories in the application processes for admissions or employment, in academic and residential programs, in employment policies and practices, in scholarship and loan programs, in athletic programs, or in any other academic, extra-curricular or VSC-sponsored programs, activities, or facilities. The prohibitions set forth in this Policy also apply to all members of the VSC community, including students, employees, and third parties who come on to campus (such as parents, visitors, independent contractors, and vendors). This Policy covers conduct that occurs off-campus, or through the use of online, electronic or digital technologies, and that has a reasonable nexus to any VSC education program or activity, for example by creating a hostile environment on campus or representing a threat to the safety of members of the VSC community or to the continuance of normal VSC operations.<sup>1</sup>

## **IV. POLICY INTENT AND OVERVIEW**

This Policy is intended to be read consistently with, and unless otherwise expressly stated, no broader than, Vermont and federal non-discrimination and harassment prevention laws,

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<sup>1</sup> Policy 311 and the Chancellor's Implementing Procedures apply to reports of sexual harassment that do not fall within the scope of Title IX Sexual Harassment or Non-Title IX Prohibited Conduct as defined in Policy 311-A and the accompanying Chancellor's Procedures for Implementation of Policy 311-A.

regulations and policies. Laws prohibiting discrimination and harassment are many and varied at both the state and federal level and apply with some differing standards and consequences to employees, students and visitors. Because harassment is a form of discrimination, it is the intent of the VSC to address all prohibitions related to non-discrimination and prevention of harassment under one comprehensive policy for ease of access and use, consistent with federal law. Certain acts of sexual harassment (including, but not limited to, sexual assault and sexual exploitation), domestic violence, dating violence, and stalking are addressed separately in VSC Policy 311-A, *Sexual Harassment, Sexual Exploitation, Domestic Violence, Dating Violence, Sexual Assault and Stalking*. Sexually harassing behavior that is deemed to meet the definitions of Title IX Sexual Harassment or Non-Title IX Prohibited Conduct under Policy 311-A and the accompanying Chancellor's Procedures for Implementation of Policy 311-A must be addressed under Policy 311-A.

## **V. DEFINITIONS**

For the purposes of this Policy, unless the context clearly requires otherwise, the following definitions apply. The specific definitions contained in an employee benefit plan will control with respect to any claim arising out of that plan.

### **A. Discrimination**

“Discrimination” means the unlawful refusal of, withholding from, exclusion from participation in, or denial of any accommodations, advantages, benefits, facilities, privileges, pay, or services of the VSC or its member Institutions on the basis of a person’s race, color, ancestry, ethnicity, national origin, place of birth, sex, sexual orientation, gender identity, creed, religion, disability, age, veteran status, marital status, genetic information, positive HIV-related blood test results, or any other status protected by state or federal law.

### **B. Harassment**

Under Vermont law, “harassment” means an incident or incidents of verbal, written, visual, or physical conduct or communication, including any incident conducted by electronic means, based on or motivated by a person's or person’s family member’s, actual or perceived race, color, ancestry, ethnicity, national origin, place of birth, sex, sexual orientation, gender identity, creed, religion, crime victim status, disability, age, veteran status, marital status, genetic information, HIV-positive blood test results, physical or mental condition or any other status protected by state or federal law that has the purpose or effect of objectively and substantially undermining and detracting from or interfering with a student’s educational performance or access to school resources or the effect of objectively undermining and detracting from or interfering with an employee’s work, or creating an objectively intimidating, hostile, or offensive environment.

Harassment includes the use of epithets, stereotypes, slurs, comments, insults, derogatory remarks, gestures, threats, graffiti, display, or circulation of written or visual material, and taunts on manner of speech and negative references to customs related to any of the protected categories.

### C. Sexual Harassment

“Sexual harassment” is unwelcome conduct of a sexual nature and it includes *quid pro quo* sexual harassment and hostile environment sexual harassment. Sexual harassment includes physical conduct of a sexual nature, such as sexual assault or other acts of sexual violence. Sexual harassment under Title IX, including sexual assault, is addressed separately in VSC Policy 311-A, *Sexual Harassment, Sexual Exploitation, Domestic Violence, Dating Violence, Sexual Assault and Stalking*. Where conduct is not deemed to meet the definitions of Title IX Sexual Harassment or Non-Title IX Prohibited Conduct under Policy 311-A, the following definitions apply:

- “*Quid pro quo* sexual harassment” generally involves a person in a position of power (such as a supervisor over an employee or a faculty member over a student) pressuring a subordinate employee or a student for sexual favors in exchange for an advancement in the workplace or academically, or under the threat of an adverse employment or academic action being taken. *Quid pro quo* sexual harassment includes situations where, for example, a student or employee is rewarded with a higher grade, a stronger evaluation, or an opportunity for advancement for granting a request for sexual favors or is punished with a lower grade, a less favorable evaluation, or denial of an educational or workplace opportunity for refusing to grant a request for sexual favors. In either case, a person uses the position of power as leverage to pressure another person into complying with a request for sexual favors.
- “Non-employee hostile environment sexual harassment” is sexual harassment of a person who is not an employee that creates a hostile educational environment and it is a form of sex discrimination. Examples of sexually harassing behavior that could create a hostile environment under appropriate circumstances include the following where the particular behavior is unwelcome to the person to whom it is directed:
  - Sexual advances, including requests for sexual favors and repeated requests for dates;
  - Intentional unwanted or offensive touching, including fondling;
  - Indecent exposure;
  - Sexually-derogatory comments, including sexually explicit comments, sexually suggestive innuendoes, sexually offensive jokes, and sexual taunts;
  - Obscene or offensive gestures;
  - Images and depictions of a sexual nature, including sexually derogatory or sexually suggestive pin-ups, posters, cartoons, and calendars; and
  - Writings of a sexually derogatory or suggestive nature.



This list is not exhaustive and other unwelcome behavior of a sexual nature, if it is severe and pervasive enough, may constitute sexual harassment. *See* Section E, Hostile Environment, below for further elaboration.

- “Employee hostile environment sexual harassment” is sexual harassment of an employee that meets the above definition of “non-employee hostile environment sexual harassment” above except that the unwelcome behavior of a sexual nature creates a hostile employment environment and it need not be severe or pervasive in order to constitute sexual harassment.

Conduct is “**unwelcome**” if the person subjected to the alleged sexually harassing behavior did not request or invite it and regards the conduct as undesirable or offensive. The fact that a person willingly participated in conduct on one occasion does not prevent that person from indicating that the same or similar conduct has become unwelcome on a subsequent occasion.

Sexual harassment may be committed by a stranger, an acquaintance, a colleague, a co-worker, a student, or someone with whom the subject of the harassment has a social, romantic or intimate relationship. Sexual harassment may be committed by or against any individual, regardless of gender, sexual orientation, or gender identity.

## **1. Sexual Harassment of a Student**

Under Vermont law, “sexual harassment of a student” means:

- (a) An incident or incidents of verbal, written, visual, or physical conduct or communication, including any incident conducted by electronic means, based on or motivated by the student’s sex, that has the purpose or effect of objectively and substantially undermining and detracting from or interfering with a student's educational performance or access to school resources or creating an objectively intimidating, hostile, or offensive environment; or
- (b) Unwelcome sexual advances, requests for sexual favors and other verbal, written, visual, or physical conduct of a sexual nature when one or both of the following occur:
  - (1) Submission to that conduct is made either explicitly or implicitly a term or condition of a student's education.
  - (2) Submission to or rejection of such conduct by a student is used as a component of the basis for decisions affecting that student.

## **2. Sexual Harassment of an Employee**

Under Vermont law, “sexual harassment of an employee” means unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature when:

- (a) Submission to that conduct is made either explicitly or implicitly a term or condition of employment; or
- (b) Submission to or rejection of such conduct by an individual is used as a component of the basis for employment decisions affecting that individual; or
- (c) The conduct has the purpose or effect of objectively interfering with an individual's work or creating an objectively intimidating, hostile or offensive work environment.

#### **D. Related Unprofessional Conduct**

“Related unprofessional conduct” on the part of a VSC employee means the initiation of or participation in an amorous or sexual relationship with a VSC student when the employee is, or may reasonably be perceived to be, in a position of power and authority over the student, even if the conduct does not otherwise constitute sexual harassment. Examples include, but are not limited to, situations where the VSC employee is an administrator, instructor, coach, advisor, work study supervisor or counselor for the student, or a member of a committee having responsibility for decisions that affect students.

#### **E. Hostile Environment**

- A “non-employee hostile educational environment” is one in which the alleged conduct is sufficiently serious as to limit or deny the ability of the person subjected to the harassment to participate in or benefit from the educational environment. The severity and pervasiveness of the alleged harassing conduct is evaluated using common sense and reasonable judgment to determine whether it created an intimidating, hostile or offensive environment. The determination is made from the perspective of a reasonable person, in the position of the person subjected to the alleged harassment, considering all of the relevant circumstances. Factors that may be considered include:

- The degree to which the conduct affected the student’s education;
- The type(s) of harassment (for example, whether it was verbal and/or physical);
- The frequency and duration of the harassing conduct;
- The identity of, and relationship between, the alleged harasser and the subject of the harassment;
- The number of individuals engaged in the harassing conduct (for example, a group of students targeting a single student); and

- The setting(s) and context(s) in which the harassing conduct occurred.

Generally, the more severe the conduct, the less need there is to show a repetitive series of incidents to establish a hostile environment, particularly if the harassment was physical. Harassing conduct may violate this Policy if, for multiple instances of conduct, it is so pervasive that when viewed from an objective standard of a similarly-situated reasonable person, it substantially and adversely affected the targeted student's educational opportunities or benefits. A single incident of harassing conduct may violate this Policy if the conduct is so severe that, when viewed from an objective standard of a similarly-situated reasonable person, it substantially and adversely affected the targeted student's equal access to educational opportunities or benefits.

- An "employee hostile work environment" is one in which the alleged conduct is sufficiently serious as to limit or deny the ability of the employee subjected to the harassment to participate in or benefit from the employment environment. The seriousness of the alleged harassing conduct is evaluated using common sense and reasonable judgment to determine whether it created an intimidating, hostile or offensive environment. The determination is made from the perspective of a reasonable person, in the position of the person subjected to the alleged harassment, considering all of the relevant circumstances. Factors that may be considered include:

- The degree to which the conduct affected the employee's work;
- The type(s) of harassment (for example, whether it was verbal and/or physical);
- The frequency and duration of the harassing conduct;
- The identity of, and relationship between, the alleged harasser and the subject of the harassment;
- The number of individuals engaged in the harassing conduct (for example, a group of employees targeting a single employee); and
- The setting(s) and context(s) in which the harassing conduct occurred.

Harassing conduct may violate this Policy if, it is sufficiently serious that when viewed from an objective standard of a similarly-situated reasonable person, it adversely affected the targeted employee's employment opportunities or benefits. Behavior that a reasonable employee with the same protected characteristic would consider to be a petty slight or trivial inconvenience shall not constitute unlawful harassment or discrimination.

## **F. Retaliation**

"Retaliation" against any person for reporting a violation of this Policy, for filing a complaint pursuant to this Policy, or for cooperating in an investigation under this Policy includes, but is not limited to: (1) pressuring a person to drop or not support a complaint; (2) encouraging a

person to provide false or misleading information; (3) engaging in conduct that may reasonably be perceived to affect adversely that person's educational, living or work environment; (4) threatening, intimidating or coercing the person; or (5) otherwise discriminating against any person for exercising their rights and responsibilities under this Policy.

## **VI. FREEDOM OF SPEECH**

The VSC recognizes that the protection of free and open speech and the open exchange of ideas are essential to any academic or artistic community, and crucial for the activity of scholars and artists. The VSC also recognizes its obligation under policy and collective bargaining agreements to respect the academic freedom of faculty members. This Policy is meant neither to proscribe nor to inhibit discussions, in or out of the classroom, of complex, controversial, or sensitive matters, including race, color, ancestry, ethnicity, national origin, place of birth, sex, sexual orientation, gender identity, creed, religion, disability, age, veteran status, marital status, genetic information, or HIV-positive status, when in the judgment of a reasonable person such discussions arise appropriately and with respect for the dignity of others. The VSC is a community of learners and as such recognizes and affirms that free, honest intellectual inquiry, debate, and constructive dialogue are vital to the academic mission of the VSC and must be protected even when the views expressed are unpopular or controversial.

The VSC also recognizes, however, that verbal conduct can be used specifically to intimidate or coerce and to inhibit genuine discourse, free inquiry, and learning. Such abuses are unacceptable. If someone believes that another's speech or writing is offensive, wrong, or hurtful, he or she is encouraged to express that judgment in the exercise of his or her own freedom of speech or to seek redress when appropriate.

## **VII. PROHIBITIONS**

### **A. Discrimination and Harassment**

All members of the VSC community are expressly prohibited from:

- (1) Discriminating against a student or employee on the basis of a protected category;
- (2) Harassing a student or employee on the basis of a protected category; or
- (3) Sexually harassing a student or employee.

### **B. Related Unprofessional Conduct**

Employees of the VSC are expressly prohibited from engaging in related unprofessional conduct with students.

### **C. HIV-related Blood Test**

Under Vermont law, it is unlawful for the VSC or any member Institution to request or require any applicant, prospective student, or current student to have an HIV-related blood test or to discriminate against an applicant, prospective student, or current student on the basis of a person's having a positive test result from an HIV-related blood test.

Under Vermont law, it is unlawful for employers and labor organizations to discriminate against, indicate a preference or limitation, refuse properly to classify or refer, or to limit or segregate membership on the basis of a person's having a positive test result from an HIV-related blood test or to require an applicant, prospective employee, employee, prospective member, or member to have an HIV-related blood test as a condition of employment or membership, classification, placement, or referral.

### **D. Retaliation**

Retaliation against any person for reporting a violation of this Policy, filing a complaint, or cooperating with an investigation into an alleged violation of this Policy is prohibited and will be considered a violation of this Policy. Retaliation under this Policy may be found whether or not the underlying complaint is ultimately found to have merit. A complaint of retaliation should be reported, and will be investigated and adjudicated, using the procedures implementing this Policy.

### **E. False Information**

Providing false information in connection with a complaint under this Policy or intentionally misleading officials in the investigation or resolution of such a complaint is prohibited and may result in disciplinary action.

## **VIII. DUTY TO COOPERATE**

All students and employees have a duty to cooperate in investigations undertaken pursuant to this Policy and are expected to provide complete, accurate, and truthful information. They may be asked to sign statements or other documents memorializing the information they provide, and may be asked to keep the substance of any interview confidential, to the extent permitted by law. Failure to cooperate fully with an investigation may subject the individual to the full range of disciplinary actions, up to and including expulsion or termination.

All actions taken to investigate and resolve complaints through this procedure shall be conducted with as much privacy, discretion and confidentiality as possible without compromising the thoroughness and fairness of the investigation. All persons involved are expected to treat the situation under investigation with respect. To conduct a thorough investigation, the investigator(s) may discuss the complaint with witnesses and those persons involved in or affected by the complaint, and those persons necessary to assist in the investigation or to implement appropriate disciplinary actions. Nothing herein shall be deemed to limit the procedural rights of unionized and other employees with regard to such investigations.

## **IX. SANCTIONS**

Violation of the prohibitions set forth in this Policy is grounds for discipline up to and including the dismissal/expulsion of students or the termination of employees. Generally, the range of sanctions for **students** includes verbal and written warnings, written reprimands, counseling, loss of privileges, probationary status, removal from Institution housing, suspension, dismissal/expulsion, revocation of degree, and/or withholding of transcript or other action determined to be appropriate under the circumstances. Generally, the range of sanctions for **employees** includes verbal warnings, written warnings, written reprimands, probation, suspension, termination of employment, non-renewal of a contract, or other action determined to be appropriate under the circumstances.

The VSC may also impose certain non-disciplinary remedial actions where appropriate, such as required counseling or training for the respondent and/or a group of students or employees, to stop the misconduct, prevent its recurrence, and remedy its effects. Additional non-disciplinary outcomes, such as extending and modifying no contact orders, room changes, class changes, work schedule changes, building restrictions, and extracurricular activity restrictions may also be imposed, regardless of the finding, to maintain an environment free from discrimination and harassment.

Conduct that violates this Policy may also be unlawful and expose a person engaging in such conduct to civil and/or criminal sanctions.

Misconduct that does not violate this Policy may violate other VSC policies, student handbooks, codes of conduct, or collective bargaining agreements and, if so, shall be handled as set forth in such other documents.

## **X. PROCEDURES**

The Chancellor shall establish and periodically update the procedures for handling complaints alleging violations of this Policy and for developing educational programs designed to prevent such conduct. Such procedures shall be consistent with Vermont and federal legal requirements and any collective bargaining agreements governing the rights and responsibilities of the VSC, its member

Institutions and employees. The procedures shall ensure that the VSC and any member Institution, upon receiving notice of conduct that allegedly violates this Policy, promptly and impartially investigates such complaints and, where complaints are substantiated, takes prompt and appropriate remedial action reasonably calculated to stop the misconduct, prevent its recurrence, and remedy its effects, if necessary.

The procedures established by the Chancellor may be modified as necessary to comply with federal and state law and to ensure that complaints of discrimination and harassment are promptly and impartially investigated and adjudicated.

Students who have concerns about perceived discrimination, harassment, related unprofessional conduct, or retaliation are encouraged to report their concerns as soon as possible. Employees who learn of an incident of discrimination, harassment, related unprofessional conduct, or retaliation are required to report this information as soon as possible, as set forth in the accompanying procedures.

The VSC's primary goals in responding to violations of this Policy are to promote the safety of the VSC community, to address discrimination and harassment, and to prevent discrimination and harassment from recurring. Individuals should not be deterred from reporting a violation of this Policy because alcohol, drugs, or violations of other VSC's policies were involved in the incident. VSC officials may, in their discretion and on a case-by-case basis, decide not to pursue relatively minor drug, alcohol, or other policy violations related to alleged violations of this Policy or, if they do pursue such violations, to handle them separately from complaints brought under this Policy.

**A. Standard of Proof**

The standard of proof applicable to the investigation and adjudication of complaints under this Policy shall be "by a preponderance of the evidence," meaning that it is more likely than not (*i.e.* there is more than a 50% likelihood) that the alleged actions or behavior in violation of the Policy occurred.


**B. Coordinators**

The Chancellor (for the Office of the Chancellor) and the President of each member Institution (for each Institution) shall appoint individuals to coordinate efforts to carry out and comply with: (1) Title IX of the Education Amendments of 1972 and the other federal and state laws prohibiting discrimination and harassment on the basis of a protected category; and (2) Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Contact information for the coordinators shall be attached to the Chancellor's Procedures.

**XI. POLICY DISTRIBUTION AND EDUCATION**

The Institutions and the Office of the Chancellor shall distribute or make available annually copies of the Policy and related procedures for all students and employees. The Institutions and the Office of the Chancellor will make available appropriate educational materials and programs to facilitate understanding and implementation of this Policy for all students and employees.

Date adopted by the Board of Trustees: September 19, 2023

Signed by:  <hr/> Sophie E. Zdatny, Chancellor
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Date	Version	Revision	Approved By
2006	1.0	Adopted	VSCS Board of Trustees
2/19/15	2.0	Updated	VSCS Board of Trustees
8/12/20	3.0	Updated per 2020 Title IX regulations	VSCS Board of Trustees
9/19/23	4.0	Updated per 2023 VT Fair Employment Practices Act	VSCS Board of Trustees



## Relevant Legal Authorities

### Federal

- 20 U.S.C. § 1681 *et seq.*, Title IX of the Education Amendments of 1972
- 34 C.F.R. Part 106 (Title IX regulations)
- 20 U.S.C. § 1232g, Family Educational Rights and Privacy Act of 1974 (FERPA)
- 34 C.F.R. Part 99 (FERPA regulations)
- 29 U.S.C. § 602(d), Equal Pay Act of 1963
- 29 U.S.C. § 621 *et seq.*, Age Discrimination in Employment Act of 1967, as amended by the Older Workers Benefit Protection Act of 1990
- 29 U.S.C. § 701 *et seq.*, Section 504 of the Rehabilitation Act of 1973, as amended
- 38 U.S.C. § 4212, Vietnam Era Veterans Readjustment Assistance Act of 1974, as amended
- 38 U.S.C. § 4301 *et seq.*, Uniformed Services Employment and Reemployment Rights Act of 1994
- 42 U.S.C. § 2000d, Title VI of the Civil Rights Act of 1964
- 42 U.S.C. § 2000e *et seq.*, Title VII of the Civil Rights Act of 1964, as amended by the Pregnancy Discrimination Act of 1978 and the Civil Rights Act of 1991
- 42 U.S.C. § 2000ff-1 *et seq.*, Genetic Information Nondiscrimination Act of 2008
- 42 U.S.C. § 12101 *et seq.*, Americans with Disabilities Act of 1990, as amended by the Americans with Disabilities Amendments Act of 2008

### State

- 3 V.S.A. § 961(6)-(8), State Employees Labor Relations Act
- 9 V.S.A. §§ 4500 *et seq.*, Vermont Public Accommodations Act
- 16 V.S.A. § 11(a)(26), Classifications and Definitions, Harassment
- 16 V.S.A. § 178, Harassment and Hazing Prevention Policies; Postsecondary Schools
- 16 V.S.A. § 570f, Harassment; Notice and Response
- 18 V.S.A. § 1127, HIV Discrimination and Testing
- 21 V.S.A. § 495, Fair Employment Practices Act
- 21 V.S.A. § 495d(5)-(12), Definitions, Disability
- 21 V.S.A. § 495d(13), Definitions, Sexual Harassment
- 21 V.S.A. § 495h, Fair Employment Practices Act – Sexual Harassment

### Cross References

- Chancellor's Procedures for Implementation of Policy 311
- VSC Policy 311-A, *Sexual Harassment, Sexual Exploitation, Domestic Violence, Dating Violence, Sexual Assault and Stalking*
- Chancellor's Procedures for Implementation of Policy 311-A
- VSC Policy 312, *Compliance with the Family Educational Rights and Privacy Act (FERPA)*

ITEM 3:

VSC Policy 435, *Financial Conflict of Interest in Research*

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**POLICY 435: FINANCIAL CONFLICT OF INTEREST IN RESEARCH**

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The Vermont State Colleges adopted a *policy on financial conflict of interest in research* in 2019 to comply with the Department of Health and Human Services regulation 42 CFR Part 50. The VSC also needed a research misconduct policy to comply with CFR 42.93.103, a requirement for having Institutional Review Board approval by HHS. To comply with this second regulation Castleton University and Northern Vermont University had their own research misconduct policies. A final regulatory requirement – to have a policy on the responsible conduct of research is needed to comply with National Institutes of Health and National Science Foundation requirements.

The revised ***Policy 435: Financial Conflict of Interest in Research*** policy addresses all three requirements. In addition to the policy, new implementing procedures have been drafted to comport with the updated policy. The procedures do not require approval from the Board of Trustees and are not included in this packet. The revised procedures can be found at <https://www.vsc.edu/wp-content/uploads/2023/08/2023-08-21-F-and-F-Materials-final.pdf> beginning on page 16.

The policy revisions are extensive, requiring a complete rewrite of the document. Therefore, instead of providing the Board with a redlined copy of the draft policy followed by a clean copy of the draft policy, we are sharing a clean copies of both the draft policy for your review.



## Manual of Policy and Procedures

Title	Number	Page
<b>EXTERNALLY FUNDED RESEARCH</b>	435	
	Date	<b>09/XX/2023</b>

### A. Definition

As defined by 42 CFR 50, “research” means a systematic investigation, study, or experiment designed to develop or contribute to generalizable knowledge. The term encompasses basic and applied research (e.g., a published article, book, or book chapter) and product development (e.g., a diagnostic test or drug.)

### B. Policy Regarding Externally Funded Research

Individuals conducting research with external funds are required to comply with the following:

1. Financial Conflict of Interest in Research: To promote objectivity in research and to ensure, to the extent possible, that the design, conduct, or reporting of research is not compromised by a researcher’s conflicting financial interests, the VSC takes steps to mitigate real or perceived financial conflicts of interest associated with externally funded research. These steps are outlined in the procedures.

Individuals at VSC institutions who conduct research are required to disclose whether they, their spouse or partner, and/or their dependent children hold any significant financial interests that might bias their research. Designated officials shall review financial disclosure statements and determine whether a financial conflict of interest exists. If a financial conflict of interest is identified, the VSC shall appropriately manage, reduce, or eliminate the conflict.

*See the Chancellor’s Procedures for Implementation of Policy 435: Financial Conflict of Interest in Research.*

2. Research Standards: To ensure that research undertaken at its institutions is conducted in an objective and ethical manner, the VSC has established research standards that

comply with federal regulations pertaining to responsible and ethical conduct of research, research on human subjects, and research involving animals.

a) Responsible and Ethical Conduct of Research

The VSC expects that all faculty, staff, and students in the system who are involved with research will follow ethical and professional standards. To ensure that participants in funded research receive training on how to ethically conduct research, the VSC maintains a Responsible and Ethical Conduct of Research plan. See the *Chancellor's Procedures for Implementation of Policy 435: Responsible and Ethical Conduct of Research*.

b) Research Involving Human Subjects

To protect human subjects from physical, psychological, or social injury resulting from research, each VSC institution maintains a process for reviewing and approving research requests that involve human subjects. Anyone planning to conduct research on human subjects must receive institutional approval before beginning work on the project. Institutions with Institutional Review Boards will comply with the U.S. Department of Health and Human Services regulations 45 CFR 46 – Protection of Human Subjects and 21 CFR 56 – Institutional Review Boards.

c) Research Involving Animals

The USDA and the Office of Laboratory Animal Welfare at the National Institutes of Health have established regulations and guidelines for the use of animals in research. The VSC requires that investigators comply with these regulations and guidelines if they use animals in their research.

3. Research Misconduct: The VSC expects that research performed at member institutions will be conducted with integrity and honesty. Institutions will promptly investigate all cases of alleged or apparent misconduct in research. The process for this is spelled out in the procedures. As defined by the U.S. Department of Health and Human regulation CFR 42.93.103, “research misconduct” means fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. Research misconduct does not include honest errors or differences of opinion. See the *Chancellor's Procedures for Implementation of Policy 435: Research Misconduct*

Signed by:

\_\_\_\_\_  
Sophie Zdatny, Chancellor

Date	Version	Revision	Approved By

DRAFT

ITEM 4:  
Claire Duke Endowment



September 13, 2023

Sophie Zdatny, Chancellor  
Vermont State Colleges System  
PO Box 7  
Montpelier, VT 05601

Dear Chancellor Zdatny,

I am pleased to send you the New Funding Source Document for establishing a new endowment at Vermont State University.

In the 1950s, Claire Laferriere Duke dreamed of attending Lyndon Teachers College and becoming a teacher. However, Claire's parents could only afford to send one of their children to college, and her older brother was already enrolled at Syracuse University. Consequently, Claire's dream was never realized. Years later, she would write in her memoir that her inability to earn a college degree and become a teacher was one of her life's greatest regrets.

The lack of a degree, though, didn't stop Claire from achieving great things. In addition to raising six children with her husband, David. She went on to become an award-winning civic leader, a successful entrepreneur, and a notable force in Vermont and national politics. Over the course of her career, she met with six U.S. Presidents and was an early champion of equal pay for women. Her tireless work in Vermont and national politics is recognized in fourteen volumes in the Library of Congress. And in 1980, the Vermont State Legislature passed a resolution honoring Claire for her outstanding service to the State of Vermont.

Throughout her life's work, Claire has taught important life lessons to the many people who've benefited from her wisdom and guidance. In recognition of this, Northern Vermont University - Lyndon awarded Claire an Honorary Doctor of Humane Letters degree at their May, 2023, commencement ceremony. Seventy years later, Claire's dream were finally realized. To mark the occasion, Claire and her family raised over \$10,000. An endowment matching fund established by a Lyndon donor contributed an additional \$10,000, bringing the total to \$20,000 to establish the Claire Duke Teachers Scholarship Endowment.

The **Claire Duke Teachers Scholarship Endowment** will provide scholarships to returning undergraduate students majoring in education and attending any of Vermont State University's campuses (excluding learning sites located outside of Vermont). Recipients must have demonstrated financial need and have intentions of pursuing a career in teaching.





We look forward to the VSC Board of Trustees' approval for the establishment of this new endowment.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael K. Smith", with a horizontal line extending to the right.

Michael K. Smith  
Interim President

Attachments: Funding Source C document

FORM C  
- NEW FUNDING SOURCE DOCUMENT - ENDOWMENTS ONLY

**VERMONT STATE UNIVERSITY**

(College Name)

Submit to Chancellor's Office for all activities based upon a new funding source.  
Place copy in front of any applicable master file.

1) Name of endowment: (type in all CAPS)

**THE CLAIRE DUKE TEACHERS SCHOLARSHIP ENDOWMENT**

2) Granting agency/donor/other funding source: (Attach supporting Documentation)

Funds contributed by Mrs. Duke's friends and families through an online campaign.

3) Purpose of endowment: (Attach supporting Documentation)

Throughout her life's work, Claire Duke has taught important life lessons to the many people who've benefited from her wisdom and guidance. In recognition of this, Northern Vermont University - Lyndon awarded Claire an Honorary Doctor of Humane Letters degree at their May, 2023, commencement ceremony. To mark the occasion, Claire and her family have raised \$20,000 to establish the Claire Duke Teachers Scholarship.

The **Claire Duke Teachers Scholarship Endowment** will provide scholarships to returning undergraduate students majoring in education and meeting the following criteria:

1. Recipient must be majoring in education.
2. Recipient must demonstrate unmet financial need.
3. Recipient must have intentions of pursuing a career in teaching.
4. GPA will not be a consideration when awarding this scholarship.
5. Students attending any of VTSU's Vermont campuses are eligible.

4) Proper accounting fund:

Regular  
Endowment

Term Endowment

5) General Ledger Activity Code(s): (as proposed or assigned)

082-85574-00000-76300-000

6a) Date Endowment Reach Endowment Status:

July, 2023

- NEW FUNDING SOURCE DOCUMENT - ENDOWMENTS ONLY

**VERMONT STATE UNIVERSITY**

(College Name)

**THE CLAIRE DUKE TEACHERS SCHOLARSHIP ENDOWMENT**

7) Reporting requirements: (format/to whom/frequency/other)

Annual reporting to Claire Duke and her family.

8a) <u>Funding amount:</u>  \$20,000.00	8b) <u>One-time</u> - OR <input checked="" type="checkbox"/> <u>Ongoing funding</u> (indicate timeframe:) Annual gifts may be made to the endowment corpus.
9a) <u>Is principal use allowed:</u> (w/Board OK?)  No.	9b) <u>If yes, is replenishment of principal allowed or required:</u>  Not Applicable

10) If investment proceeds generated, indicate intended disposition:

- Per Board Approved Spending Procedure
- Fully expend for program as prescribed
- Increase principal for inflation and expend remainder
- All Investment earnings added for \_\_\_ years before expending for endowment purposes begins
- Other (describe:)

11) <u>President:</u> Mike Smith	12) <u>Date to Ch's Ofc:</u> August 1, 2023	13) <u>Date Board Approved:</u>
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Version 4/17/2008

## FORM A: PRINCIPAL INVESTIGATOR/PROJECT INITIATOR INFORMATION

<b>Chosen Name</b>	Lieblappen, Ross M.
<b>Email</b>	rml10300@vtc.vsc.edu
<b>I am:</b>	Faculty
<b>Institution</b>	Castleton University / Northern Vermont University / Vermont Technical College
<b>Site</b>	Williston

## PROJECT INFORMATION

<b>Proposal Submission Deadline</b>	04/01/23
<b>Link to Funding Announcement</b>	<a href="https://www.highergov.com/contract-opportunity/2022-erdc-broad-agency-announcement-baa-w912hz-22-baa-01-k-0456f/">https://www.highergov.com/contract-opportunity/2022-erdc-broad-agency-announcement-baa-w912hz-22-baa-01-k-0456f/</a>
<b>Project Title</b>	Interpretations of Polar Environments at the Nanoscale
<b>Project Description</b>	The primary objective of this proposal is to advance the boundary of characterizing various polar terrains from the microscale and into the nanoscale. Leveraging recent advances in X-ray imaging, we aim to connect physical and biological attributes of terrain state, thereby advancing existing basic research of soil, snow, and ice microstructure. By reaching nanoscale resolution, we can achieve the critical application of locating and imaging microbes in situ using X-ray computed tomography. Combined with analyzing critical features of the terrain, we will be able to significantly improve our understanding of microbially-mediated processes in cold regions.
<b>Co-Principal Investigators</b>	Michelle Sama, Jill Nichols, Alden Adolph
<b>Estimated Project Start Date</b>	08/01/23
<b>Estimated Project End Date</b>	07/31/26

## FUNDER INFORMATION

<b>Name of Funder (the organization providing the funding DIRECTLY to your institution)</b>	US Army Engineer Research and Development Center (ERDC)
---	---

Is the funding for this project passed through from another organization to this one?

No

Funding Type (If this is pass-through funding, choose the primary source of funding)

Federal

## PROJECT COST

Estimated Total Project Cost (including direct costs and indirect costs to be paid by the grant, as well as match contributions)

3236611

Estimated Direct Costs

3092196

Estimated Indirect Costs

144415

How were indirect costs calculated?

My institution's federally-negotiated rate

Is a match required for this project?

No

Does this proposal request \$1,500,000 or more per fiscal year, or involve \$375,000 or more in match per year?

Yes

I understand that before I can submit this proposal, the VSC Board of Trustees must approve it, since it requests over \$1,500,000 per year, or it involves \$375,000 or more in match per year.

Yes

## OTHER INFORMATION

### AFFIRMATIONS

Does this grant involve research on human subjects?

No

Are you anticipating that this project will include a course release for one or more people?

No

Are you anticipating purchasing new hardware or software as part of this project?

Yes

I understand that I am required to follow the VSC Hardware and Software Acquisition and Review Policy before making hardware or software purchases.

Yes

Are you anticipating purchasing new equipment as part of this project?

Yes

I understand that I must speak to my institution's Director of Facilities before purchasing equipment.

Yes

Are you anticipating hiring new full or part-time employees as part of this project?

Yes

I understand that before hiring any grant-funded staff, I must talk to the HR Officer for my institution.

Yes

## Approvals

Approval Status Pending

Approved By Mari Perez

Approval Date

Comments

[May 5, 2023 11:47 AM] Mari Perez APPROVED  
 [Jun 1, 2023 3:54 PM] Nicole Mace SKIPPED  
 [Jun 1, 2023 3:54 PM] Betsy Ward: Skipped Nicole Mace as approver  
 [Jun 8, 2023 9:27 AM] Betsy Ward: Proposal already submitted so no further approvals needed.  
 [Jun 8, 2023 9:27 AM] Lit Tyler SKIPPED  
 [Jun 8, 2023 9:27 AM] Betsy Ward: Skipped Lit Tyler as approver

## FORM B: INFORMATION ABOUT THE PROPOSAL

<b>Chosen Name of Principal Investigator/Project Initiator (PI)</b>	Lieblappen, Ross M.
<b>Email</b>	rml10300@vtc.vsc.edu
<b>Institution</b>	Castleton University / Northern Vermont University / Vermont Technical College
<b>Primary Site</b>	Williston
<b>I am:</b>	Faculty
<b>Title of Proposal</b>	Interpretations of Polar Environments at the Nanoscale
<b>Name of Funder (the organization providing the funding DIRECTLY to your institution)</b>	U.S. Army Engineer Research and Development Center (ERDC)
<b>Is funding for this project being passed through from another organization?</b>	No
<b>Funding Type (if this is pass-through funding, choose the primary source of funding)</b>	Federal
<b>Proposal Submission Deadline</b>	04/01/23
<b>Estimated Project Start Date</b>	08/01/23
<b>Estimated Project End Date</b>	07/31/23

## BUDGET

<b>Total Project Cost (including direct costs, indirect costs, and match)</b>	3236611
<b>Direct Costs (to be paid by the grant)</b>	3092196
<b>Are matching funds required for this project?</b>	No
<b>Indirect Costs</b>	144415
<b>How were indirect costs determined?</b>	My institution's federally-negotiated rate

Does this proposal request \$750,000 or more per fiscal year, or involve a match of \$375,000 or more per year? If so, the VSC Board of Trustees must approve the proposal.

Yes

Board of Trustees Approval Status Pending approval

Will any non-employee participants be compensated by funds from this grant, such as participants in a research project? (Contractors and vendors are not considered participants.)

No

Budget Upload <https://www.formstack.com/admin/download/file/14586099055>

## CONFLICT OF INTEREST DISCLOSURE

I have read the VSC Employee Conflict of Interest Policy (VSC Policy 210).

Yes

According to VSC Policy 210, a conflict of interest "may exist when an employee, a close relative, or a person or organization with whom the employee is associated has an existing or potential financial or other interest which involves the employee's VSC responsibilities."

I have no conflict(s) or appearance of conflict(s) of interest to report related to this proposal.

## RESEARCH PROPOSALS

Is this a research proposal? (See definition below.)

Yes

Will this proposal obtain, use, study, analyze, or generate identifiable private information or identifiable biospecimens from any individual(s)?

No

I have completed Form D: Disclosure of Significant Interests.

Yes

Form D Upload - PI <https://www.formstack.com/admin/download/file/14586099061>

I have completed CITI Conflict of Interest (COI) training within the past three years.

Yes

COI Completion Certificate Upload - PI <https://www.formstack.com/admin/download/file/14586099063>



**Are there co-PIs from your institution listed on this proposal?** Yes

**All co-PIs from your institution have completed a Form D for this proposal.** Yes

**Form D Upload - Co-PIs** <https://www.formstack.com/admin/download/file/14586099066>

**All co-PIs from your institution have completed the COI training within the past three years.** Yes

**COI Completion Certificate Upload - Co-PIs** <https://www.formstack.com/admin/download/file/14586099068>

## CERTIFICATION

**I agree that the information I have supplied on this form is true and accurate to the best of my ability.** Yes

**I attest that I am not suspended, debarred, or otherwise excluded from federally-funded projects. Additionally, I attest that any co-PIs on this project (if applicable) are not suspended, debarred, or excluded from federally-funded projects.** Yes

**Date** May 05, 2023

## Approvals

**Approval Status** Pending

**Approved By** Nolan Atkins, Lit Tyler, Mari Perez

## Approval Date

**Comments** [May 5, 2023 11:46 AM] Mari Perez: Budget has been approved by Budget Operations.  
 [May 5, 2023 12:34 PM] Lit Tyler APPROVED  
 [May 5, 2023 1:06 PM] Betsy Ward: Skipped Betsy Ward as approver  
 [May 5, 2023 7:46 PM] Nolan Atkins APPROVED  
 [May 17, 2023 6:33 AM] Mari Perez APPROVED  
 [Jun 1, 2023 4:09 PM] Betsy Ward: Skipped Nicole Mace as approver  
 [Jun 5, 2023 11:50 AM] Nicole Mace SKIPPED  
 [Jun 8, 2023 12:27 PM] Betsy Ward: Proposal already submitted. N/A for further approvals.

ITEM 5:  
Department of Army Contract

Proposal in response to Announcement W912HZ-22-BAA-01, Fundamental Research  
CRREL-3: Biogeochemical Processes in Earth Materials Technical Area

Vermont Technical College  
Office of Sponsored Programs  
124 Admin Drive  
Randolph Center, VT 05061  
802-728-1000

### **Interpretations of Polar Environments at the Nanoscale**

Ross Lieblappen, Principal Investigator, Associate Professor, Vermont Technical College,  
[Ross.Lieblappen@vtc.edu](mailto:Ross.Lieblappen@vtc.edu), 781-424-7268  
Michelle Sama, Associate Professor, Vermont Technical College  
Jill Nichols, Science Teacher, Lyndon Institute  
Alden Adolph, Assistant Professor, St. Olaf College

Cost: Phase I: \$1,599,669; Phase II: \$992,222; Phase III: \$700,575  
Total Cost: \$3,292,467  
Duration: 3 years

### **Objective Statement**

The primary objective of this proposal is to advance the boundary of characterizing various polar terrains from the microscale and into the nanoscale. Leveraging recent advances in X-ray imaging, we aim to connect physical and biological attributes of terrain state, thereby advancing existing basic research of soil, snow, and ice microstructure. By reaching nanoscale resolution, we can achieve the critical application of locating and imaging microbes in situ using X-ray computed tomography. Combined with analyzing critical features of the terrain, we will be able to significantly improve our understanding of microbially-mediated processes in cold regions.

### **Executive Summary**

To remain a leader in the Arctic, knowledge of the terrain characteristics is crucial for the U.S. Army Arctic strategy as it dictates basic necessities such as transport logistics, forecasts of ecosystem stability, and ability to respond to various threats. Permafrost covers an area of 18 million km<sup>2</sup> in the Arctic, while winter sea ice coverage represents an additional 15 million km<sup>2</sup>. Meanwhile seasonal snow can cover close to 33% of Earth's land mass. These environments have complex microstructure that provides safe refuge to a vast array of microbes. A complete understanding of the microstructure is essential for decision making that aligns with U.S. Army, DoD, and national goals for this region. This proposal puts forward a plan to take a large step forward in scientific understanding of how microbes relate to their microenvironments. Leveraging existing resources and advances in 3D imaging capabilities, we seek to obtain the first in-situ characterization of microbes in natural polar environments, alongside quantifying the details of the dynamic pore structure. This study progresses our knowledge of basic biological process impacting Arctic terrain, the influence of increased freeze-thaw cycles on microbial communities, and our ability to predict microbial community behavior in a changing climate.

## Introduction

As the climate continues to change at a rate not previously observed in human history, preparation for this new regime is paramount for national security interest. The latest assessment report from the International Panel on Climate Change (IPCC) identifies the most significant risks to North America include risk of degradation of marine, coastal, and terrestrial ecosystems, risk of reduced surface water availability for irrigated agriculture and other human uses, risk to food and nutritional security through changes in agriculture, livestock, hunting, fisheries, and aquaculture productivity, and risks to well-being, livelihoods, and economic activities from cascading and compounding climate hazards (IPCC, 2022). Arctic and sub-Arctic environments are at the forefront of these changes, already experiencing warming two to three times the global annual average. The last seven years are collectively the warmest seven on record (Druckenmiller et al., 2022). Basic scientific knowledge gaps threaten the U.S. Army's readiness for operations over various terrain in these environments. Responding to the requests outlined by the U.S. Army Corps of Engineers Engineer Research and Development Center (ERDC) Biogeochemical Processes in Earth Materials Technical Area (CRREL-3), this proposal addresses several specific research efforts including 1) biological processes affecting the nature and rate of transformation of natural constituents in environmental media, 2) behavior of soil microbes under natural and stressed environmental conditions, 3) biogeochemical processes in natural and disturbed ecosystems and terrain, and 4) application of advanced concepts of complexity to studying and predicting the behavior of microbial and plant communities in a variety of environmental conditions. Recent advances in imaging capabilities have allowed investigations at sub-micron resolution, enabling 3D imaging of individual microbes, however, these advances have not yet been realized in Arctic environments. Herein, we will examine what can be learned in permafrost, soils, and sea ice, answering questions at the scale of microbes with global implications.

Roughly a quarter of the northern hemisphere is underlain by permafrost, defined as ground that remains below 0 °C for two or more years (Zhang et al., 1999). Permafrost also happens to be a large carbon sink, storing twice as much carbon than is currently in Earth's atmosphere (Hugelius et al., 2014). Within permafrost microbes are ubiquitous, numbering  $10^5$  to  $10^9$  cells  $g^{-1}$  in Arctic regions (Ottoni et al., 2022). Microbial activity is greatly influenced by temperature, with decreased activity often occurring deeper in the soil profile where cold permafrost temperatures persist. During thaw, microbial degradation results in the release of vast quantities of both carbon and other greenhouse gases into the atmosphere, catalyzing a positive-feedback loop (Tornocai et al., 2009). Over the next 80 years, 40% of existing permafrost is expected to thaw (Chadburn et al., 2017). The impacts of high disturbance events such as thaws over short time frames are dominated by stochastic rather than deterministic processes, and thus, detailed information characterizing the biome is needed to understand the impacts on microbial communities (Ernakovich et al., 2021). These can be large spatiotemporal impacts as it is estimated that as much as  $10^{21}$  microbes are released through melting ice annually (Smith et al., 2004). Further, the detailed understanding of the specific microbial communities is critical as recent studies have shown different response of permafrost microbes based on their origin (Barbato et al., 2022).

Increased frequency of permafrost freeze-thaw cycles not only impacts the release of gases and microbes, but also greatly alters the structure of the permafrost itself. It influences the topography of permafrost landscapes by introducing frost heaves, cryoturbation, and the introduction of surface morphological features such as ice wedges, polygons, sorted circles, and hummocks (Ping et al., 2015). Knowledge of these formations is mission critical for U.S. Army interest regarding transport over Arctic regions. Recent studies have shown that pore connectivity is significantly impacted by repeated freeze-thaw cycles, with decreased pore connectivity correlated with increased prevalence of freeze-thaw events (Rooney et al., 2022). These impacts were most significant in water-filled pores and at the smallest spatial scales (i.e., less than 100  $\mu m$ ), regulating both surface water flow and accumulation. Freeze-thaw events also redistributes particles within the soil matrix at the microscale, and these

microenvironments are what provide homes to the various microbes in Arctic regions. Changes to this architecture not only have impacts on water flow, but also organic matter decomposition and oxygen availability (Waring et al., 2020; Wanzek et al., 2018). What remains poorly understood however, is characterizing the precise location of microbes within the permafrost, one of the key objectives of this proposal.

Human health is critically dependent on microbial flora as regulators of pathogenic microbes, sources of nutrition and therapeutic treatments. With great diversity in growth requirements, global warming stands to shift the populations of microbes to favor those that can withstand global warming and those with more stringent growth needs will be less likely to adapt. The permafrost will give a snapshot into which microbes are there and based on their growth niche, will be most likely to perish when environmental conditions change. One large area of concern is the pharmaceutical wealth that could be lost if microbe populations shift, and species disappear. In addition, comparing permafrost samples to current microbes, especially those resistant to antibiotics may give valuable information on the mutations and genetic changes that could in part be precipitated by an increase in carbon load and global warming.

Not only does the physical location of permafrost likely influence microstructure, but so does potentially the permafrost type. Organic permafrost constitutes a large portion of permafrost affected soils (Hugelius et al., 2013), yet few studies have looked to quantify any differences relative to mineral permafrost. Thus, there remains a gap in our knowledge of the spatial microheterogeneity in frozen soils, and subsequent impacts on microbial distributions. Better understanding this spatial microheterogeneity improves the U.S. Army's ability to understand biological processes in this landscape.

A second Arctic environmental with complex spatiotemporal heterogeneity at the micron and sub-micron resolution is sea ice. Sea ice appears to form an impenetrable boundary at the ocean-atmosphere interface in polar regions, yet in fact its porous structure provides critical pathways for the exchange of heat, gases, salts, and other chemical species impacting the global climate. A complex media composed of ice, liquid brine, air pockets, and salt precipitates, it covers 7% of Earth's ocean surface (Maykut, 1985). Due to its growth mechanism, brine channels form at spacing intervals of 0.5 to 1.0 mm, with morphology that then varies both spatially and temporally due to temperature considerations, with thicknesses varying from several microns to several cm (Eicken, 2003, Lieblappen et al., 2018). However, it is some of the small brine channels that provide safe refuge for sea ice microbial communities, with concentrations 1-2 orders of magnitude greater than the surrounding brine channels (Krembs et al., 2000). Not only have microbes not yet been imaged in sea ice in 3D, complete characterization of brine channels in sea ice is still lacking. Although colder ice down to 15  $\mu\text{m}$  and warmer ice down to 25  $\mu\text{m}$  has been imaged with various techniques (Lieblappen et al., 2018; Salomon et al., 2022), spatial resolution has limited further progress. Recent advanced in sub-micron X-ray microscopes (XRM) allow for the breakthrough of this spatial barrier. This will aid in related studies, such as quantifying the geometry and distribution of oil inclusions in sea ice, which has significant impacts on the biogeochemical activities and function of sea ice in the Arctic (Desmond et al., 2021).

Overlying most of the Arctic land mass, and a large portion of Earth's overall land mass seasonally is snow. Recent work has established that microorganisms are capable of surviving in snow across the planet, from the Canadian High Arctic to Iceland, Greenland, and the European Alps (e.g., Lutz et al., 2015; Harding et al., 2011). Dust can play a significant role in transporting microbes from distal locations to the Arctic. The microheterogeneity of snow pores then plays a potentially critical role in providing a habitat for these microorganisms. Thus, characterizing both the pore connectivity concurrently with the spatial location of the microbes would provide a large step forward in advancing our understanding of microbial activity in this biome.

## Approach

Leveraging resources from multiple institutions with vertical integration of high school and undergraduate students as well as a postdoc, we will seek a comprehensive approach to answer a variety of biogeochemical questions at the nanoscale. The primary media for investigation will be field-collected permafrost, sea ice, and snow. For each media, we aim to collect samples from diverse geographic regions to determine spatial heterogeneity. For field-collected permafrost studies, we seek to compare mineral and organic permafrost, and have thus selected field locations of Kangerlussuaq, Greenland, the Canadian High Arctic Research Station, and the CRREL Permafrost Tunnel near Fairbanks, Alaska. These locations have extensive existing resources and a history of partnering with CRREL-related scientific research, and the CRREL Permafrost Tunnel has an unmatched controlled environment for extracting permafrost cores. We expect these locations to have distinct microbial communities, and will investigate whether observed patterns are relevant across different soils. As each location also has collocated seasonal snow, snow samples will be collected from nearby sites. Sea ice collection in Year 3 will be primarily from Utqiagvik, AK due to the extensive existing resources and history of partnering with CRREL-related projects. If spatial separation is shown to be a critical parameter, a second sea ice collection as part of Phase III of the proposal will be scheduled for Pituffik, Greenland for ease of access and existing resources.

For all media, we will characterize the terrain by measuring bulk properties such as density, water content, and micronutrient concentrations. The goal will be to assess the importance of microorganisms on these material properties. Using XRM, we will then quantify microstructural parameters such as pore size distributions and pore connectivity. Here, not only do we want to understand the role of microorganisms in potentially impacting these parameters, but also for better understanding the terrain itself. We seek to extrapolate nano- and microscale parameters to knowledge of material strength at the landscape scale. This will enable us to help the Army with mission critical decisions related to infrastructure built on this terrain or mobility across this terrain. After imaging field-collected media, we will then perform laboratory experiments to examine the effects of freeze-thaw cycles on the microstructure and location of microbial communities. 4D imaging using XRM will allow us to visualize and perform a time series analysis of how each media behaves during thaw events.

Phase I: Year 1 of the project will be devoted to XRM instrument acquisition and development of sample preparation protocols. To-date, only a single institute (Donald Danforth Plant Science Center) has successfully 3D imaged microbes in-situ using X-ray computed tomography (Duncan et al., 2022). We will work closely with this center for developing techniques for stabilizing and imaging microbes in permafrost and sea ice. As part of Phase I we will image existing lab prepared specimens to establish protocols prior to collecting field samples. Included in Year 1 is the purchase of a cold room at Vermont Technical College for storing samples.

Phase II: Year 2 of the project will be permafrost and snow sample collection from both Kangerlussuaq, Greenland and the CRREL Permafrost Tunnel. Samples will be transported back to Vermont Technical College for imaging on the newly acquired X-ray microscope.

Phase III: Year 3 of the project will be permafrost and snow sample collection from the Canadian High Arctic Research Station. In addition, Year 3 of the project will include sea ice sample collection from Utqiagvik, AK, and potentially Pituffik, Greenland. Included in Phase III is continued data analysis of permafrost and snow studies, dissemination of results, and development of a long term viability plan for the X-ray microscope.

Vermont Technical College (VTC) is the only technical college in the state of Vermont, an EPSCoR state, and offers a mixture of two-year and four-year degrees, as well as a variety of certificate programs. VTC prides itself on preparing graduates for the workforce with a 98% job and advanced education placement rate, and ranking 1<sup>st</sup> in VT and 7<sup>th</sup> nationally for return on investment. 46% of

students are first-generation and 48% are Pell-eligible. VTC is in the process of uniting with Castleton University and Northern Vermont University to become Vermont State University (VTSU) on June 1, 2023. VTSU was approved by the Vermont State Colleges System Board of Trustees and the Vermont Legislature and committed to provide high-quality education to our students and preserve and expand access to affordable education statewide. The new VTSU will have a UEI number and registered in SAM.gov by the time the award is issued. If funded, the new award will be made to VTSU and has a point of contact that can be reached for any administrative questions, that is Mari Perez, Assistant Vice President of Sponsored Programs. Her email is [mari.perez@vermontstate.edu](mailto:mari.perez@vermontstate.edu).

Having recently established a \$12 million Advanced Manufacturing Center that includes a state-of-the-art X-ray micro-computed tomography scanner geared for imaging metals in additive manufacturing, and for which PI Lieblappen is the primary operator, VTC has demonstrated its capabilities for high resolution imaging. This proposal represents the next step forward by reaching sub-micron resolution. Partnering with Lyndon Institute enables high school students from an underrepresented region of Vermont to be introduced to scientific research at an early age, as well as the unique VTC college environment.

### **Military and/or Civil Payoffs**

The knowledge gained in developing the nano-scale imaging techniques described in this proposal to characterize permafrost, snow, and sea ice, and then locate microbes in said media will help answer a variety of applied research questions with significant military and/or civil payoffs. These include, but are not limited to:

- How do microorganisms impact material properties of permafrost soils, snow, and sea ice? Do they contribute to the strength by altering the microstructure? Does their orientation have any impact on the material properties?
- What can nano-scale parameters of structure tell us about the overall strength of the material? Can quantities such as pore connectivity or pore sizes be used to determine the military's ability to install infrastructure on various terrain?
- How does knowledge of nano-scale properties help the military assess terrain for mobility? Is mobility impacted by the prevalence and/or microheterogeneity of microorganisms?
- How might material properties change as a result of climate change? What is the influence of freeze-thaw cycles on the distribution of microbial communities and biologic processes? How significantly do freeze-thaw cycles impact the microstructure and subsequent material strength of various media?

### **Methods**

X-ray micro-computed tomography ( $\mu$ CT) has extensively been used in the geosciences to non-destructively image and characterize a variety of porous media, including sea ice, snow, and soils, with spatial resolution down to several microns. Applications in the biogeosciences has been somewhat limited both due to spatial resolution limitations as well as similar X-ray attenuation of microbes to surrounding soil organic matter. The X-ray microscope (XRM) pushes the spatial resolution limit into the sub-micron realm by incorporating a scintillator-coated objective lens that converts the X-ray signal to visible light, and magnifies the image collected by the detector. Recent advances with utilizing microbe-specific contrast agents in conjunction with XRM have enabled imaging of microbe-plant interactions, providing insights for phenotype and form-function studies (Duncan et al., 2022). These studies have used a multiscale approach that provides visualization of the entire host root system in situ while also showing the 3D location of fungal structures (Duncan et al., 2022). This proposal will build off of this work by imaging field-collected samples rather than those from a controlled lab setting, necessitating refinements in contrast agent application and imaging protocols. Ultimately the selection of an effective contrast agent will determine the success in accurately imaging microbes. Duncan et al.,

2022, found success doping microbes with osmium tetroxide and ethanolic phosphotungstic acid (ePTA). It is unknown the extent to which these contrast agents can determine microbial viability. Here we will rely upon the liquid phase of permafrost during freeze-thaw cycles and the liquid brine channels of sea ice for delivering contrast agent to the microbes.

Protocol development for imaging microbes will be conducted prior to field-collected specimens being used. Mock core samples will be obtained using A Grainger soil core sampler (model: 41113910). Samples will be perfused with water to allow ice channels to form and stored at  $-20^{\circ}\text{C}$  for a minimum of 7 days prior to XRM image analysis. Soil from locations around the Randolph Center campus of Vermont Technical College will be sampled, making sure to collect from different locations with presumably varied levels of organic material and biomass levels.

Nitrogen-fixing *Azotobacter* form thick-walled cysts that withstand long-term freezing, and their large size will assist in detection. The lipid-enclosed cysts of the *Azotobacter* will allow for differentiation in liquid channels and biomass, particularly in proximity to undecomposed plant (root) matter. *Azotobacter* will be differentiated from similar-sized fungal spores based on intracellular milieu. Mycorrhizal fungi will be analyzed as described in Duncan et al., 2022. The segmentation of fungal hyphae will provide contrast to the organic matter of the permafrost. Fungal spores will be differentiated based on size, proximity, and location. To identify bacteria and fungi in the permafrost samples, quantitative polymerase chain reaction (q-PCR) or droplet digital polymerase chain reaction dd-PCR analysis will allow rapid detection of microbes in fragile samples. In addition, dd-PCR will allow for identification of antibiotic resistance genes in permafrost microbes.

To complement XRM analysis, soil biomass sampling at different levels of the core sample will be completed to compare microbial and fungal biomass in permafrost samples as a measurement of soil health and nutritional load. Carbon analysis of permafrost samples will represent the microbe carrying capacity. While it is unknown if microbe viability will be measurable, biomass sampling will indicate soil health, and this is greatly dependent on microbial populations. Biomass sampling will be done using a microBIOMETER apparatus.

Once protocols have been established for soils, we will then conduct our first field campaign to the CRREL permafrost tunnel to collect specimens. Here we will collect both mineral and organic permafrost cores from several locations to test spatial micro-heterogeneity. Sample collection will be performed wearing Tyvek suits to avoid sample contamination. Above ground, simultaneous snow samples will be collected. Large blocks from which internal sub-samples will later be cut will be transported in coolers. Both permafrost cores and snow samples will be shipped and then stored at sub-eutectic temperatures until imaging. Upon return, contrast agents will be fed/applied to microbes in the new cold room at Vermont Technical College. We note that detailed methodologies for sample preparation are not yet fully established in the literature as this is cutting edge research. A significant outcome of this project is the creation of such methodology. The only existing protocols for similar work are outlined in Duncan et al., 2022, but are not applicable for field collected specimens. Thus, details of the protocol will be determined as part of the scope of this proposal in consultation with the Donald Danforth Plant Science Center. This protocol will then be replicated in Kangerlussuaq, Greenland and at the Canadian High Arctic Research Station. Sea ice cores will later be drilled from diverse locations near Utqiagvik, AK, and potentially Pituffik, Greenland. A modified version of the contrast agent application will be applied to microbes living in brine channels.

Characterizing terrain microstructure, including pore size and connectivity, in all media will be relatively straightforward as there is sufficient contrast between the various components in permafrost, snow, and sea ice. For this work, it will be critical field-collected specimens are transported and stored at sub-eutectic temperatures. A cooling stage attached to the XRM will allow samples to be raised to and maintained at in-situ temperatures for scanning. Freeze-thaw experiments will be used to assess the impact of hysteresis on microstructure.



## **Tasks, Milestones, and Deliverables**

### Task A1 Objective: Establish protocol for imaging microbes utilizing X-ray computed tomography

In order to be able to image microbes at the sub-micron scale, we will need to acquire a state-of-the-art XRM that can achieve spatial resolution 0.5 – 0.7  $\mu\text{m}$  with voxel sizes around 70 nm. Once the XRM is acquired, we will test various contrast agents on lab and local soil microbes to determine which provide the best contrast in consultation with the Donald Danforth Plant Science Center. The primary deliverable for Task A1 will be the standard operating procedure for the XRM and the protocol for imaging microbes with this equipment.

### Task B1 Objective: Characterize microstructural properties of permafrost, sea ice, and snow

Task B1 includes field collection of permafrost, sea ice, and snow samples from diverse locations in both Year 2 and Year 3. As described above, sampling will start at the CRREL permafrost tunnel and then continue in Kangerlussuaq, Greenland in Year 2. After samples have arrived at VTC, they will be scanned with the XRM, first focusing on material properties. Simultaneously, bulk measurements such as density and water content will be conducted. The primary deliverable for Task B1 will be the datasets characterizing each media for microstructure.

### Task B2 Objective: Image microbes in-situ natural polar environments

Task B2 is focused on locating and imaging the field-collected microbes in-situ using XRM. This is the most novel part of the proposal as it represents the first of its kind imaging. To assess quality of results, biomass sampling will be performed to compare microbial and fungal biomass in permafrost samples. For all media, micronutrient concentrations will be measured. The primary deliverable for Task B2 will be the datasets characterizing the microstructural location of microbes within each media.

### Task C1 Objective: Train students on state-of-the-art XRM imaging

Task C1 revolves around giving students a diverse set of skill sets needed for understanding biologic processes in cold region terrain. This includes: operating expensive and fragile machinery such as an XRM; attention to detail; following procedures accurately; safety around potentially dangerous equipment; designing innovative experimental setups; performing critical analysis; interpreting data; data management of very large datasets (up to several GB per sample); and presentation of final results. Students will learn these skills through a combination of summer internships and final group capstone projects for classes. Co-PI Adolph plans to send students she has trained in snow science from St. Olaf's college for a summer research experience. Co-PI Nichols will send and co-advise high school students from nearby Lyndon Institute for summer research experience. PI Lieblappen and the post-doc will serve as the primary training on the XRM and an advisor to any related VTC capstone projects. The primary deliverable is exposure to scientific research for high school and undergraduate students.

### Task D1 Objective: Disseminate results

Task D1 is focused on the most critical task of disseminating results with the greater community. PI Lieblappen and Co-PI Sama will mentor students in submitting findings for publication in peer-reviewed scientific journals and presenting at scientific meetings. Additionally, students will present findings to their peers at school, as well as the general public. The project will conclude with a final comprehensive report detailing all findings and future steps, and delivery of the XRM to CRREL.

Tasks	Task POP	Milestones	Deliverables
<b>Task A1.</b> Establish protocol for imaging microbes utilizing X-ray computed tomography	Month 1-12	<ul style="list-style-type: none"> <li>• Acquire XRM (Q1 – Q3)</li> <li>• Train with existing methodologies for imaging microbes via XRM (Q2 – Q3)</li> <li>• Test various contrast agents on lab grown microbes (Q3 – Q4)</li> <li>• Create inventory of best practices (Q4)</li> </ul>	<ul style="list-style-type: none"> <li>• Algorithms and code v1 (Yr1 Q3)</li> <li>• Standard operating procedure for XRM imaging protocols (Yr1 Q4)</li> <li>• Technical Report (Yr1 Q4)</li> <li>• Initial images of lab grown microbes</li> </ul>
<b>Task B1.</b> Characterize microstructural properties of permafrost, sea ice, and snow from diverse locations	Month 13-36	<ul style="list-style-type: none"> <li>• Collect field permafrost, sea ice, and snow samples from 3 locations (Q2 – Q6)</li> <li>• Image field samples of permafrost, sea ice, and snow (Q5 – Q7)</li> </ul>	<ul style="list-style-type: none"> <li>• Dataset (Yr2 Q4)</li> <li>• Dataset (Yr3 Q4)</li> <li>• Technical Report (Yr2 Q4)</li> </ul>
<b>Task B2.</b> Image microbes in-situ natural polar environments	Month 13-36	<ul style="list-style-type: none"> <li>• Image samples with XRM focusing on microbial communities (Q1 – Q7)</li> <li>• Determine microbe orientation and microstructural location (Q5 – Q7)</li> <li>• Perform freeze-thaw experiments (Q5 – Q7)</li> <li>• Perform biomass sampling (Q6 – Q7)</li> </ul>	<ul style="list-style-type: none"> <li>• Dataset (Yr2 Q4)</li> <li>• Dataset (Yr3 Q4)</li> <li>• Technical Report (Yr3 Q4)</li> </ul>
<b>Task C1.</b> Train students on state-of-the-art XRM imaging	Month 13-30	<ul style="list-style-type: none"> <li>• Recruit student researchers (Q1)</li> <li>• Train students on safe operation of XRM (Q2 – Q4)</li> <li>• Encourage student researchers to develop their own testable hypotheses (Q5 – Q8)</li> </ul>	<ul style="list-style-type: none"> <li>• Trained student XRM technicians</li> <li>• Undergraduate and high school student exposure to scientific research</li> </ul>
<b>Task D1.</b> Disseminate results	Month 24-36	<ul style="list-style-type: none"> <li>• Attend scientific meetings (Q2)</li> <li>• Write 2-3 scientific papers for publication (Q2 – Q4)</li> <li>• Present results in local schools and public events (Q2 – Q4)</li> </ul>	<ul style="list-style-type: none"> <li>• 2-3 scientific publications (Yr3 Q4)</li> <li>• Poster presentations at American Geophysical Union Fall meeting (Yr2/3 Q2)</li> <li>• Various presentations for the general public and school children</li> <li>• Final comprehensive report (Yr3 Q4)</li> <li>• Delivery of XRM to CRREL</li> </ul>

**Yearly Integrated Outcomes:**

When synthesized as an integrated suite of Year 1 products, the research conducted and deliverables generated provide sub-micron resolution of geologic media using XRM, at a TRL level 3, and initial protocols for imaging microbes in locally collected soil samples, at a TRL level 4. This advances science by pushing the resolution of microstructural analysis of soils into the nano-scale. Additionally, it provides CT acquired 3D images of microbes in a novel media. When synthesized as an integrated suite of Year 2 products, the research conducted and deliverables generated provide permafrost and snow characterization using XRM and identification of microbial communities located in said media, at a TRL level 5. This advances science by yielding the first 3D images of microbes in field-collected media. When synthesized as an integrated suite of Year 3 products, the research conducted and deliverables generated provide additional permafrost and snow characterization, as well as sea ice characterization, at a TRL level 5. For each media, we will image and characterize the location and orientation of microbes, at a TRL level 5. This advances science by locating microbes in another media, and allowing for applied research into how microbial activity and biologic processes influence nano/microstructure and material strength.

**Quality Assurance Surveillance Plan**

The PI will meet all government requirements regarding reporting and measuring progress towards milestones and deliverables. In addition, the PI will have conversations with the Program Officer and will reach out if there are any significant changes in scope of work or deliverables. This will ensure that there is active communication with the assigned Program Officer to ensure project is on track and stay in compliance. The institution and PI will submit quarterly progress reports and invoicing will be done on a quarterly basis. This will include rating performance on each task on a scale from exceptional to very good to satisfactory to marginal to unsatisfactory. We will use a periodic sampling method each quarter to ensure progress each made on each task. If deemed necessary, a full surveillance matrix will be developed. All results will be included in annual technical reports and the final comprehensive report.

**Intellectual Property & Data Rights**

This proposal has no intellectual property or data rights concerns. Data management at VTC is driven by comprehensive policies developed by the Vermont State Colleges System's (VSCS) Board of Trustees, as well as policies developed at the institutional level. Moreover, VTC complies with the Uniform Guidance, 2 CFR 200, with regard to all federal grant awards and subawards. In addition to the Chief Financial Officer, Controller, General Counsel, Chief Technology Officer, Director of Business Operations, and Director of Institutional Research, the VSCS Office of the Chancellor employs a Grants Compliance Manager to ensure proper stewardship of awards through the lenses of finance, governance, and IT, functions which are managed centrally in the Chancellor's Office. On the VTC campus, the Associate Dean of Administration oversees all grants and contracts.

VSCS policies related to data management include, but are not limited to the following: Data Access Security Policy; Data Security Practices; Data Security Requirements for Third Parties; Definition of What is Secure; File Sharing Plan; Information Sensitivity Policy; IT Encryption Policy; Password and Access Management Policy; and Security Audit Policy. VTC's Policies T309, Curriculum Planning and Scheduling, and T108, Computer Software, also come to bear in the execution of this award.

This proposal will produce many types of data in the following formats: all samples that are scanned with the  $\mu$ CT scanner, all microstructural 3D metrics computed, any visualizations (both images and video), CAD files and other 3D models, reports and presentations to government partners. The data are characterized as observational, experimental, reference, derived, and simulated.

The data types referenced include data generated by computer, data collected from sensors or instruments, images, audio files, video files, reports, and surveys. The data are not of a sensitive nature. There will be no restrictions placed on the data nor any limitations on CRREL's access to information and/or data.

### **Government Support**

This proposal anticipates needing government support in providing access to CRREL and mentoring from CRREL scientists for students prior to the initial field campaign. Through exposure to cold terrain prior to the field research campaigns, students can better prepare for the expectations of a short field campaign. This will also allow students to ask questions and begin thinking of their own research ideas prior to travel.

### **Conclusion**

We are only just beginning to realize the critical importance of sub-micron level detail on the structure and biological function within various environmental media. In a changing climate, nowhere is this more operationally essential than in the Arctic. Microbes are ubiquitous in Arctic ecosystems, but their precise microstructural location and distribution remains unknown. Increased freeze-thaw cycling in permafrost stresses this environment, resulting in changes to the microbial community function. This proposal attempts to leverage existing resources and advances in imaging capabilities to improve our scientific understanding of these biogeochemical processes. The collaborative approach outlined not only will increase the capabilities and variety of questions that can be answered, but also open pathways to historically underrepresented populations within Vermont.

*We note that this proposal has not been submitted to any other agency.*

**Budget Summary**

Item	Phase I - YEAR 1	Phase II – YEAR 2	Phase III – YEAR 3	Total Project Costs
Salaries	\$23,977	\$119,569	\$119,569	\$263,115
Benefits	\$3,642	\$35,687	\$35,687	\$75,016
Infrastructure	\$1,400,000	\$422,269	\$77,411	\$1,899,680
Travel	\$4,000	\$136,826	\$259,259	\$400,085
Materials & Supplies	\$4,000	\$75,000	\$30,000	\$109,000
Computing Supplies		\$60,000	\$25,000	\$85,000
Building upgrades	\$150,000	\$40,000		\$190,000
Contingency Costs (8%)		\$71,148	\$43,754	\$114,902
Publication Costs			\$10,000	\$10,000
Freight Costs			\$30,000	\$30,000
Indirect Costs	\$14,051	\$70,067	\$70,067	\$154,185
<b>Total Costs</b>	<b>\$1,599,669</b>	<b>\$1,030,567</b>	<b>\$700,748</b>	<b>\$3,330,984</b>

**Labor summary**

			Task A1 Labor		
Name	Title	Hourly Rate	Year 1 (# hours)	Year 2 (# hours)	Year 3 (# hours)
Ross Lieblappen	PI	41.0256	406.25	0	0
Michelle Sama	Co-PI	44.9868	162.50	0	0
Jill Nichols	Co-PI	24.6112	0	0	0
Post-doc	Post-doc	20.5128	0	0	0
Student	Student	877.50	0	0	0
Student	Student	877.50	0	0	0
Student	Student	877.50	0	0	0
			Task B1 Labor		
Name	Title	Hourly Rate	Year 1 (# hours)	Year 2 (# hours)	Year 3 (# hours)
Ross Lieblappen	PI	41.0256	0	162.50	162.50
Michelle Sama	Co-PI	44.9868	0	0	0
Jill Nichols	Co-PI	24.6112	0	81.25	81.25
Post-doc	Post-doc	20.5128	0	650	650
Student	Student	5.40	0	230	230
Student	Student	877.50	0	230	230
Student	Student	877.50	0	230	230
			Task B2 Labor		
Name	Title	Hourly Rate	Year 1 (# hours)	Year 2 (# hours)	Year 3 (# hours)
Ross Lieblappen	PI	41.0256	0	162.50	162.50
Michelle Sama	Co-PI	44.9868	0	325	325
Jill Nichols	Co-PI	24.6112	0	81.25	81.25
Post-doc	Post-doc	20.5128	0	650	650
Student	Student	877.50	0	230	230
Student	Student	877.50	0	230	230
Student	Student	877.50	0	230	230

<b>Task C1 Labor</b>					
<b>Name</b>	<b>Title</b>	<b>Hourly Rate</b>	<b>Year 1 (# hours)</b>	<b>Year 2 (# hours)</b>	<b>Year 3 (# hours)</b>
Ross Lieblappen	PI	41.0256	0	162.50	81.25
Michelle Sama	Co-PI	44.9868	0	81.25	40.625
Jill Nichols	Co-PI	24.6112	0	0	0
Post-doc	Post-doc	20.5128	0	650	325
Student	Student	877.50	0	230.625	115.625
Student	Student	877.50	0	230.625	115.625
Student	Student	877.50	0	230.625	115.625
<b>Task D1 Labor</b>					
<b>Name</b>	<b>Title</b>	<b>Hourly Rate</b>	<b>Year 1 (# hours)</b>	<b>Year 2 (# hours)</b>	<b>Year 3 (# hours)</b>
Ross Lieblappen	PI	41.0256	0	0	81.25
Michelle Sama	Co-PI	44.9868	0	0	40.625
Jill Nichols	Co-PI	24.6112	0	0	0
Post-doc	Post-doc	20.5128	0	0	325
Student	Student	877.50	0	0	115
Student	Student	877.50	0	0	115
Student	Student	877.50	0	0	115

### **Roles and Budget Justification**

The budget supports PI Lieblappen for 2.5 months FTE Year 1 and 3.0 months FTE for Years 2 and 3, and Co-PI Sama for 1 months FTE Year 1 and 2.5 months FTE for Years 2 and 3. Additionally it supports 1.0 months FTE for Co-PI Jill Nichols for Years 2 and 3 and a postdoc researcher for Years 2 and 3. Fringe benefit rates for faculty during the academic year are based on the employee's salary and type of insurance selected. The benefits will cover FICA, retirement, health insurance for employee and may include family. Employees may also select dental and vision insurance which will increase their fringe benefits, depending on the type of insurance selected. Faculty and part-time staff are only charged the FICA rate of 7.65% of their salary during the summer months. PI Lieblappen will oversee XRM acquisition, develop training protocols, and lead field research campaigns. Co-PI Sama will oversee sample preparation and application of contrast agent onto microbes. The postdoctoral researcher will work under the supervision of PI Lieblappen and Co-PI Sama and will lead contrast agent application and XRM scanning experiments, as well as helping with field campaigns. Years 2 and 3 also provide summer funding for 3 undergraduate and high school students to engage in scientific research projects. Co-PI Nichols will oversee high school student engagement.

Phase I consists largely of acquiring the XRM (\$1,400,000), as well as a cooling stage and cold room to be sited at Vermont Technical College in Randolph Center, VT. The travel budget for Year 1 is for PI Lieblappen and Co-PI Sama to travel to the Donald Danforth Plant Science Center to learn from existing sample preparation and contrast agent application protocols for imaging microbes in situ. Travel for sample collection in Years 2 for 5 people is to Fairbanks, AK and Kangerlussuaq, Greenland (3 weeks in each location) and travel to San Francisco to attend the American Geophysics Fall meeting. Travel for sample collection in Year 3 for 5 people is to the Canadian High Arctic Research Station, Utqiagvik, AK, and Pituffik, Greenland (3 weeks in each location) and travel to San Francisco to attend the American Geophysics Fall meeting. Collectively, the travel costs include: airfare at \$55,245, per diem at \$58,200, incidentals at \$11,250, lodging at \$114,738, car rental & gas at \$21,899, equipment/baggage transport at \$19,929, equipment rental at \$50,000, bear guard at \$18,640, permitting/fees at \$12,528, travel to the air national guard at Scotia or Baltimore at \$9,000, logistical support at \$16,880, field training at \$3,596, and medical clearances at \$7,500. A breakdown by specific

trip is given in the attached Excel budget details document. Since field work expenses can be weather dependent and unpredictable, and to account for unexpected price inflation, a 8% contingency costs was added for Years 2 and 3.

Budget for Year 1 includes upgrading the VTC science department lab with a cold room (\$65,000) and necessary electrical/plumbing upgrades (\$89,000). Materials and supplies budget for Year 2 is largely devoted for field equipment for sample collection. This includes extreme cold weather gear and Tyvek suits for clean sampling for 5 people (\$14,985), permafrost and sea ice core barrels, drills, screws, saws, and bagging (\$20,319), coolers and core barrels for shipping (\$4,000), snow sampling equipment (\$5,252), digital thermometers (\$950), conductivity meter (\$740), sample preparation equipment (\$10,000), contrast agents and supplies for growing microbes (\$20,000), and office supplies (\$2,000). Computing supplies budget for Year 2 includes both field and work computers (\$10,000), as well as CT visualization software (\$50,000). Continued software licenses is included in the computing supplies budget for Year 3 (\$25,000). Materials and supplies budget for Year 3 includes replenishing some consumable field supplies such as core tubing and shipping containers (\$3,840), contrast agents (\$10,000), cold weather gear for potentially different students (\$6,000), and consumables used for presentations in local schools during outreach events (\$10,000). Publication and dissemination costs are included for Year 3 (\$10,000). Equipment budget for Year 2 includes a service contract for the XRM (\$77,411), a cold stage for the XRM (\$94,858), and PCR (\$100,000). Note that the PCR has associated supplies detailed in the attached Excel budget detail document (\$111,250). Equipment budget for Year 3 includes a continued service contract for the XRM (\$77,411). Year 2 budget includes \$40,000 for building renovations to incorporate the cold room, install a temperature alarm system, and provide maintenance on said system. Year 3 budget also includes \$30,000 freight cost for delivering the XRM to CRREL and any building repairs at VTC at the completion of the project.

Indirect costs are charged of salaries and wages at the federally negotiated rate of 58.60%. In Year 1, IDC are included for the amount of \$14,051. In Years 2 and 3, the IDC charged is at \$70,067 per year charged on total salaries included on the project.

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### Ross Lieblappen (PI)

#### SUMMARY

Dr. Ross Lieblappen has employed  $\mu$ CT for imaging a wide variety of geologic specimens over the last 17 years, including sea ice, soil, snow, and permafrost. He has experience participating in 3 polar field campaigns to both the Antarctic and the Arctic. Recently, as part of the new Advanced Manufacturing Center at Vermont Technical College, PI Lieblappen has led  $\mu$ CT imaging projects in the manufacturing sphere, partnering with a host of industry partners. He has authored or co-authored over 20 peer-reviewed publications and technical reports, mostly related to X-ray imaging.

#### APPOINTMENTS

- '22 - present Associate Professor.** Vermont Technical College Department of Science
- '19 - present Department Co-Chair.** Vermont Technical College Department of Science
- '17 - '22 Assistant Professor.** Vermont Technical College Department of Science
- '16 - '20 Post-Doctoral Fellow.** US Army Corps of Engineers Cold Regions Research and Engineering Lab
- '17 Visiting Instructor.** Middlebury College Department of Environmental Studies
- '16 Adjunct Faculty.** Champlain College Division of Information Technology & Sciences

#### EDUCATION

- '11 - '16** Thayer School of Engineering at Dartmouth College: Ph.D. in Engineering
- '08 - '10** University of Vermont: M.S. in Mathematics
- '03 - '07** Middlebury College: B.A. in Environmental Studies with a focus in Chemistry, and minor in Mathematics

#### Ten Recent and Relevant Publications (\*CRREL related publication)

1. \*Darrow, M. M., **Lieblappen, R. M.** 2020. Visualizing cation treatment effects on frozen clay soils. *Cold Reg. Sci. Technol.* 175, 103085. doi:10.1016/j.coldregions.2020.103085.
2. \*Courville, Z. R., **Lieblappen, R. M.**, Thurston, A. K., Barbato, R. A., Fegyveresi, J. M., Farnsworth, L. B., Derry, J., Jones, R. M., Doherty, S. J., Rosten, S. A. 2020. Microorganisms associated with dust on alpine snow. *Front. Earth Sci.* 8, 122. doi:10.3389/feart.2020.00122.
3. \*Frantz, C. M., Light, B., Farley, S. M., Carpenter, S., **Lieblappen, R.**, Courville, Z., Orellana, M., Junge, K. 2019. Physical and Optical Characteristics of Heavily Melted 'Rotten' Arctic Sea Ice. *Cryosphere.* 13, 775-793, doi:10.5194/tc-13-775-2019.
4. \***Lieblappen, R.**, Kumar, D., Pauls, S., Obbard, R. 2018. A Network Model for Characterizing Brine Channels in Sea Ice. *Cryosphere.* 12, 1013-1026. doi:10.5194/tc-12-1013-2018.
5. \*Iverson, N., **Lieb-Lappen, R. M.**, Dunbar, N., Kim, E., Golden, E. J., Obbard, R. W. 2017. The First Physical Evidence of Subglacial Volcanism under the West Antarctic Ice Sheet. *Sci. Rep.* 7, 11457. doi:10.1038/s41598-017-11515-3.
6. \***Lieb-Lappen, R. M.**, Golden, E. J., Obbard, R. W. 2017. Metrics for Interpreting the Microstructure of Sea Ice using X-Ray Micro-Computed Tomography. *Cold Reg. Sci. Technol.* 138, 24-35. doi:10.1016/j.coldregions.2017.03.001.
7. \*Obbard, R. W., **Lieb-Lappen, R. M.**, Nordick, K. V., Golden, E. J., Leonard, J. R., Lanzirrotti, A., Newville, M. G. 2016. Synchrotron X-Ray Fluorescence Spectroscopy of Salts in Natural Sea Ice. *Earth Space Sci.* 3. doi: 10.1002/2016EA000172.
8. \*Asenath-Smith, E., **Lieblappen, R.**, Taylor, S., Winter, R. R., Melendy Jr., T. D., Moser, R., Haehnel, R. B. 2022. Observation of crack arrest in ice by high aspect ratio particles during uniaxial compression. CRREL Technical Report ERDC/CRREL TR-22-3.
9. \*Thurston, A. K., Courville, Z. R., Farnsworth, L. B., **Lieblappen, R. M.**, Rosten, S. A., Fegyveresi, J. M., Doherty, S. J., Jones, R. M., Barbato, R. A. 2021. Microscale dynamics between dust and microorganisms in alpine snowpack. CRREL Technical Report ERDC/CRREL TR-20-12.

10.\* Costanza-Robinson, M. S., Harrold, K. H., **Lieb-Lappen, R. M.** 2008. X-ray Microtomography Determination of Air-Water Interfacial Area-Water Saturation Relationships in Sandy Porous Media. *Environ. Sci. Technol.* 42 (8), 2949-2956. doi:10.1021/es072080d.

### Michelle Sama (Co-PI)

#### SUMMARY

Dr. Michelle Sama has taught microbiology for the past 12 years at Vermont Technical College. In addition to teaching, she is responsible for cultivating and maintaining stock cultures of microbes for long term use. Dr. Sama has extensive experience in fixing, staining and mounting biological specimens including in situ hybridization and FISH. Dr. Sama is proficient in two-photon, fluorescent, confocal and Hoffman microscopy. In addition, Dr. Sama has experience in RT-PCR, q-PCR and in-situ PCR.

#### APPOINTMENTS

‘18-present Associate Professor, Vermont Technical College Department of Science  
 ‘15-present Department Chair, Vermont Technical College Department of Science  
 ‘12-‘18- Assistant Professor, Vermont Technical College Department of Science  
 ‘11-‘15- Manager, Neuroscience Center at Dartmouth College, Geisel School of Medicine  
 ‘08-‘11- Post-doctoral Fellow, Department of Physiology and Neurobiology, Dartmouth College of Medicine, Lebanon, NH

#### EDUCATION

‘07 University of Kentucky, Ph.D in Molecular and Biomedical Pharmacology  
 ‘02 Marist College, B.S. in Biology with focus in Botany  
 ‘9 Dutchess Community College, A.A.S. Biology

#### PUBLICATIONS

1. Abdul HM, Furman JL, **Sama MA**, Mathis DM, Norris CM. NFATs and Alzheimer’s disease. *Molecular Cell Pharmacology* January 1, 2010.
2. Ericson M, **Sama MA**, Yeh HH. Acute ethanol exposure elevates muscarinic tone in the septohippocampal system. *Journal of Neurophysiology*, November 11, 2009.
3. H. Mohammad Abdul, **MA Sama**, JL. Furman, DM. Mathis, TL. Beckett, AM. Weidner, M. P. Murphy, H. LeVine 3rd, SD. Kraner, and CM. Norris. Cognitive decline in Alzheimer’s disease is associated with selective changes in calcineurin/NFAT signaling. *Journal of Neuroscience*, October 14, 2009.
4. **Sama MA**, Mathis DM Furman JL, Abdul HM, Artiushin IA, Kraner SD, Norris CM. Interleukin-1beta-dependent signaling between astrocytes and neurons depends critically on astrocytic calcineurin/NFAT activity. *Journal of Biological Chemistry*, August 8, 2008.
5. Gant JC, **Sama MA**, Landfield PW, Thibault O. Early and Simultaneous Emergence of Multiple Hippocampal Biomarkers of Aging is Mediated by Ca<sup>2+</sup>-Induced Ca<sup>2+</sup>-Release. *Journal of Neuroscience*, February 16, 2006

**Jill Nichols (Co-PI)****SUMMARY**

Jill Nichols has taught high school science at Lyndon Institute for the last 8 years. Subjects include Biology, Environmental Science, Anatomy and Physiology, Science Seminar, Freshman Seminar, and Freshman Science. She has experience teaching a variety of levels, from Applied to College-level courses. Ms. Nichols was named Teacher of the Year by her colleagues for the 2021-2022 school year. Collaborative projects have included working with the Vermont Department of Forests, Parks, and Recreation Urban and Community Forestry program on data collection for a tree inventory for the town of Lyndon.

**APPOINTMENTS**

‘15-present Science Teacher, Lyndon Institute  
‘17-’18 Science Department Chair, Lyndon Institute  
‘12-’14 Science Teacher, Okemo Mountain School  
‘10-’12 Data and Project Technician, Mammoth Lakes Trails and Public Access  
‘09 Field Assistant, University of Montana, Missoula  
‘08 Field Assistant, University of Notre Dame  
‘07-’08 Academic Consultant for Excellent, Middlebury College  
‘06 Research Assistant, Middlebury College  
‘05 Ecology Teaching Assistant, Middlebury College

**EDUCATION**

‘15 Champlain College, Teacher Apprenticeship Program, Teaching Licensure 7-12 Science Endorsement  
‘08 Middlebury College; B.A. in Environmental Studies with a focus in Conservation Biology

## Alden Adolph (Co-PI)

### SUMMARY

Dr. Alden Adolph studies physical properties of snow and firn. Her work has focused on optical and thermal properties, as well as gas transport processes in firn including  $\mu$ CT imaging. She has conducted fieldwork in Greenland on three different polar research campaigns, and has done extensive seasonal snow fieldwork in New Hampshire and Minnesota over the last ten years. She has mentored over twenty undergraduate research students in her lab since beginning her position at St. Olaf College.

### APPOINTMENTS

- '17 - **present Assistant Professor.** St. Olaf College Department of Physics
- '20 - **present Director of Engineering Studies Concentration.** St. Olaf College
- '12 - '17 **Graduate Research Assistant,** Dartmouth College

### EDUCATION

- '12 – '17 Thayer School of Engineering at Dartmouth College: Ph.D. in Engineering
- '11 – '12 Dartmouth College: B.E. in Engineering Studies Concentration in Mechanical Engineering
- '07 – '11 Dartmouth College: B.A. in Engineering Studies

### FUNDED GRANTS

- '22 – '27 **NSF CAREER Award,** Arctic Natural Sciences Program, *Quantifying the Effects of Liquid Water Content on the Spectral Albedo of Snow* (\$557,178)

### Publications

1. Zikan, K., A.C. Adolph, W. Brown, and R. Fausto. "Comparison of MODIS Surface Temperatures to In-situ Measurements on the Greenland Ice Sheet from 2014-2017." *Journal of Glaciology*, 1-12 (2022): doi: 10.1017/jog.2022.51
2. Schneider, A., M. Flanner, R.D. Roo, A.C. Adolph. "Monitoring of Snow Surface Near-Infrared Bidirectional Reflectance Factors with Added Light Absorbing Impurities." *The Cryosphere*. *The Cryosphere*, 13, 1753-1766 (2019): doi:10.5194/tc-13- 1753-2019
3. Adolph, A.C., Albert, M.R., and Hall, D.K. "Near-surface temperature inversion during summer at Summit, Greenland, and its relation to MODIS-derived surface temperatures." *The Cryosphere*, 12, 907-920 (2018): doi: 10.5194/tc-12-907-2018
4. Adolph, A.C., M.R. Albert, J. Lazarcik, J. Dibb, J. Amante, and A. Price. "Dominance of grain size impacts on seasonal snow albedo at deforested sites in New Hampshire." *Journal of Geophysical Research: Atmospheres* 122 (2017): 121-139, doi:10.1002/2016JD025362
5. Lazarcik, J., J.E. Dibb, A.C. Adolph, J.M. Amante, C.P. Wake, E. Scheuer, M.M. Mineau, and M.R. Albert. "Major fraction of black carbon is flushed from the melting New Hampshire snowpack nearly as quickly as soluble impurities." *Journal of Geophysical Research: Atmospheres* 122 (2017): 537-553, doi:10.1002/2016JD025351
6. Contosta, A., A.C. Adolph, D. Burchsted, E. Burakowski, M. Green, D. Guerra, M. Albert, J. Dibb, M. Martin, W. H. McDowell, M. Routhier, C. Wake, R. Whitaker, and W. Wollheim. "A longer vernal window: the role of winter coldness and snowpack in driving spring transitions and lags." *Global Change Biology* 23 (2017): 1610-1625, doi:10.1111/gcb.13517
7. Adolph, A.C., and M.R. Albert. "Gas diffusivity and permeability through the firn column at Summit, Greenland: measurements and comparison to microstructural properties." *The Cryosphere* 8.1 (2014): 319-328, doi:10.5194/tc-8-319-2014
8. Adolph, A.C., and M.R. Albert. "An improved technique to measure firn diffusivity." *International Journal of Heat and Mass Transfer* 61 (2013): 598-604