

Colgate University Grant Application Approval

Please **complete and sign** this form, attach draft proposal including budget, and route in the order of the reviewers listed on verso.

The form, proposal, and budget are due in the Grants Office, G6 JB Colgate Hall, at least **5 working days before your deadline**.

This is an internal Colgate form and is not sent to funding agencies.

Submission format: ☒ Electronic ☐ Paper

Submission deadline N/A/

Your office phone extension x7456

This is a ☒ new proposal ☐ revision ☐ supplement

Project Director / PI Nick Moore Department Mathematics

Project Title Erosion, Transport, and Dispersion in Granular and Porous Media

Funding Agency NSF via Florida State University

Specific program Mathematical and Physical Sciences Solicitation #, if applicable _____

Proposed duration of grant: Start date August 1, 2022 End date July 31, 2023

Total project cost \$19,921

Amount requested from agency \$19,921

University cost sharing (if any) _____

Grant will cover: ☒ summer faculty salary
☐ academic year faculty salary/leave
☐ student research assistant(s)
☐ other personnel
☐ equipment
☐ supplies
☒ travel
☐ other: _____

Budget:

Is **cost sharing** required by the agency? ☒ No ☐ Yes – explain: _____

What Colgate source(s) will be used for cost sharing? _____

How has each **salary** figure been calculated? One summer month is 1/9 annual salary

What **percentage increase** in each salary has been used for each year? 2.5%

What percentage of each salary has been used to calculate **fringe benefits**? 32%

Does the agency allow **indirect costs**? ☐ No ☒ Yes, rate ☒ 35% of MTDC ☐ other: _____

Is this a collaborative proposal? ☒ No ☐ Yes, with: _____

Does it involve a **subaward** / **subcontract**? ☐ No ☒ Yes, to ☐ from ☒ Florida State University

What **space** is required for this project? (building, room #, sq. ft.): _____

Is any modification or addition to existing space required? ☒ No ☐ Yes – explain: _____

Equipment: Is special installation required? ☒ No ☐ Yes – explain below.

Are there requirements for air conditioning, electrical, plumbing, or other construction? ☒ No ☐ Yes – explain below.

Will the equipment require a service contract? ☒ No ☐ Yes – explain below. Attach extra page if needed.

Will Colgate incur **ongoing costs** as a result of this grant? ☒ No ☐ Yes – explain: _____

Personnel: Does the proposal include any grant-funded position(s) other than students or current employees?

☒ No ☐ Yes – explain and obtain signatures below. _____

Additional review and acknowledgments: Does the proposed project require the use of human subjects, laboratory animals, hazardous substances, or other items that may necessitate University review or an assurance by the University of compliance with federal regulations? ☒ No ☐ Yes – explain and obtain appropriate signature(s) below.

Investigator Certifications – Please check appropriate boxes; sign below.

☒ **Federal grants:** The PI and co-PIs have each attached a signed **Disclosure Statement Regarding Financial Conflict of Interest**.

☐ **Projects with human subjects:** The PI and co-PIs certify that they have completed or will complete required human subjects training.

☐ **NIH/PHS proposals:** The PI and co-PIs have each attached two signed NIH/PHS forms: **PI Assurance Certification** and **Financial Conflict of Interest Disclosure**.

☒ **NSF proposals:** The PI acknowledges that s/he has read the **Colgate Guidelines for Responsible Conduct of Research Training** and understands that s/he will be responsible for implementing the training of all student and/or postdoctoral researchers.

☐ **Projects requiring student travel:** The PI acknowledges that each individual who travels in conjunction with the grant will be required to complete the required **Forms for Colgate-sponsored Travel** (found on the Off-Campus Study web site).

☐ **Grant-funded positions:** The PI acknowledges that grant-funded position(s) will terminate when the grant funding ends.

I hereby certify that the statements made in the attached proposal and on this form are true and complete to the best of my knowledge. I agree to comply with the award terms and conditions if an award is made.

→ **PROJECT DIRECTOR / PI signature**

Nick Moore

73950FFFF98D4EF...

10/17/2022

date

Review and acknowledgement signatures as needed

Note: The signature indicates acknowledgment of the proposal for purposes of submission, but is not to be considered formal approval. The PI/PI is responsible for understanding and ensuring compliance with all institutional policies and procedures and funding agency terms and conditions if an award is made.

Proposals including new positions: _____ Assoc. VP, Human Resources

Proposals requiring use of human subjects: _____ Chair, Institutional Review Board

Proposals requiring use of laboratory animals: _____ Chair, Institutional Animal Care & Use Committee

Proposals requiring use of hazardous substances: _____ Chemical Hygiene/Biosafety Officer

Proposals requiring use of radioactive substances: _____ Radiation Safety Officer

This proposal has been read and approved by:

<i>Dan Schult</i> DocuSigned by: E96291EB52E3421...	10/17/2022
<i>Rick Gier</i> DocuSigned by: A99F1C99E4C498...	10/17/2022
<i>Trish St. Leger</i> DocuSigned by: 492FE88AAEC24AE...	10/20/2022
<i>Lesleigh Cushing</i> DocuSigned by: 7ABAD26D597D44D...	10/17/2022
<i>Laura Festine</i> DocuSigned by: E982DA065705473...	10/17/2022
<i>Brittany Plumley</i> DocuSigned by: 54D3CG3CE81040F...	10/18/2022

Chair, Dept. of	Mathematics
Director, Div. of	NASC
Vice Provost	
Dean of the Faculty and Provost	
Director, University Grants and Sponsored Research	
Assistant Controller & Director of Grant Accounting	
Associate VP and Controller	

COLGATE UNIVERSITY
DISCLOSURE STATEMENT REGARDING EXTERNAL AFFILIATIONS
for compliance with
POLICY ON INVESTIGATOR FINANCIAL CONFLICT OF INTEREST

Name Nick Moore
 Department Mathematics
 Name of Funding Sponsor NSF via Florida State University
 Project ID number and Title Erosion, Transport, and Dispersion in Granular and Porous Media
 Project Period August 1, 2022 - July 31, 2023

1. Are you or any member of your immediate family (spouse or dependent children) an officer, director, partner, trustee, employee, advisory board member, or agent of the external organization funding this sponsored project, or of any external organization whose financial interests would reasonably appear to be affected by this sponsored project?

- ☐ Yes (please describe in detail on an attached sheet the nature and extent of the affiliation)
☒ No

2. Are you or any member of your immediate family (together or separately) the actual or beneficial owner of more than five percent (5%) of the voting stock or controlling interest of the external organization funding this sponsored project, or any external organization from which goods and services will be obtained under this sponsored project, or any external organization whose financial interests would reasonably appear to be affected by the sponsored project?

- ☐ Yes (please describe in detail on an attached sheet the nature and extent of the interest)
☒ No

3. Have you or any member of your immediate family (together or separately) derived income within the past year, or do you or any member of your immediate family (together or separately) anticipate deriving income exceeding \$10,000 per year from the external organization funding this sponsored project, or any external organization from which goods and services will be obtained under this sponsored project, or any external organization whose financial interests would reasonably appear to be affected by the sponsored project?

- ☐ Yes (please describe on an attached page the amount of income and the reason for which it was or will be derived)
☒ No

CERTIFICATION BY FACULTY

- A. I have read and understand the Colgate University Policy on Investigator Conflict of Interest.
 B. To the best of my knowledge, I have made all required financial disclosures.
 C. I agree to comply with any conditions or restrictions imposed by Colgate University for the purpose of managing, reducing, or eliminating actual or potential conflicts of interest in connection with this grant. If I am unable to comply, I understand that the University may decline the grant award.

Signature of Faculty Member Nick Moore Date 10/17/2022

CERTIFICATION BY VICE PROVOST

- ☒ No financial conflict of interest appears to exist.
☐ A financial conflict of interest may exist. My recommendation is attached.
☐ A financial conflict of interest may exist. I will forward my recommendation to the Dean of the Faculty and the Provost by _____.

Signature of Vice Provost Trish St. Leger Date 10/20/2022

NSF Subaward Budget	Annual salary	Year 3	Total
Start Date:	FY23 91,500	Summer 2023	
A. Senior Personnel - 2.5% increase per year	FY24 93788		
PI - 1 summer month		\$10,421.00	
Co-PI			
B. Other Personnel			
Post Doc			
Other Professionals (technician)			
Undergraduates			
Academic Year			
Summer			
(2021 - 2023 @ \$600/week; 2024 @ \$610; 2025 @ \$620)			
		\$10,421.00	\$10,421.00
C. Fringe Benefits			
Faculty @ 32%		\$3,335.00	
Post doc @ 32%		\$0.00	
Admin and Professional @ 32%			
Support & Technical Staff @ 32%			
Student(s) @ 10%		\$0.00	
		\$3,335.00	\$3,335.00
D. Equipment		\$0.00	\$0.00
E. Travel			
Foreign			
Domestic		\$1,000.00	
		\$1,000.00	\$1,000.00
F. Participant Support			
Stipends			
Subsistence			
Other			
		\$0.00	\$0.00
G. Other Direct Costs			
1. Materials and Supplies			
2. Publication Costs			
3. Consultant Services			
4. Computer Services			
5. Subawards			
6. Other			
		\$0.00	\$0.00
TOTAL Direct Costs		\$14,756.00	\$14,756.00
MTDC base (Direct Costs less equipment and academic year student wages)		\$14,756.00	
Indirect Costs			
On campus @ 35% MTDC		\$5,165.00	
TOTAL Indirect Costs		\$5,165.00	\$5,165.00
Total Request		\$19,921.00	\$19,921.00

Budget Justification

A: Senior Personnel (co-PI: Matthew Moore)

The requested senior personnel funding is to support one month of co-PI Moore's summer salary in year 3. During this period, the PIs will work together to develop and implement algorithms, write papers, and work closely with the graduate student. Co-PI Moore's summer salary in year 3 will be \$93,788 with the monthly salary listed in the table:

	Year 3	Total
co-PI Moore	\$10,421	\$10,421

C: Fringe Benefits

The fringe benefits of co-PI Moore at Colgate University are 32%.

	Year 3	Total
co-PI Moore Fringe	\$3,335	\$3,335
Total	\$3,335	\$3,335

E: Domestic Travel

The requested travel funds is to partially fund a domestic trip for co-PI Moore in year 3. The expected costs per conference participant is \$1,000 with a breakdown of \$300 for airfare, \$300 for lodging, \$56 for local transportation, \$144 for meals (four days at \$36 per day), and \$200 for conference registration. Potential meeting venues include several SIAM Meetings (Annual Meetings, CSE, Dynamical Systems), APS Fluids Meetings, or appropriately themed workshops. Alternatively, co-PI Moore may use these travel funds to visit PI Quaife and the funded graduate student at FSU in order to collaborate on the project.

	Year 3	Total
Domestic Travel	\$1,000	\$1,000

H: Total Direct Costs

Total of Sections A–G.

Year 3	Total
\$14,756	\$14,756

I: Indirect Costs

Colgate University's indirect cost rate is 35% for research on modified total direct costs (MTDC). The base for overhead is \$14,756 in year 3.

Year 3	Total
\$5,165	\$5,165

J: Total Direct and Indirect Costs

Total of Sections H and I.

Year 3	Total
\$19,921	\$19,921

Personnel

The research at Colgate University will be performed by co-PI Moore.

Deliverables

The deliverables from Colgate University include algorithms, computational tools, peer-reviewed publications, presentations at conferences, and outreach. The deliverables will be centered around the following tasks taken directly from the Project Description.

1: Characterizing permeability, anisotropy, and pore size dynamics to inform Darcy-based homogenized models. The high-fidelity numerical simulations permit precise measurements of coarse-grained quantities such as permeability and anisotropy, as they depend on medium features such as porosity and microstructure geometry. Statistical measurements of these properties taken from large batches of the numerical simulations will inform reduced models based on Darcy's law with variable permeability to represent unresolved pore-structure that varies dynamically in time due to erosion.

2: Developing and validating new parameterizations using machine learning techniques and numerical simulations. The batches of high-fidelity simulations will be used to train machine learning and deep-neural networks. These new models will parameterize the effects of erosion on the evolution of macroscopic properties. Once trained, the networks will enable predictions of how medium properties respond dynamically to changes in environmental conditions without reliance on the (more expensive) direct physical simulations.

Timeline

Deliverable 1 has been completed and a manuscript is currently under review at Physica D. Year 3 will focus on deliverable 2.

Coordination with PI Quaife

Throughout the project, co-PI Moore will work closely with both PI Quaife and the funded Ph.D. student at FSU, Jake Cherry. This will include frequent emails and phone conversations, 1–2 Zoom and/or Google Meet meetings per month. The code and papers will be maintained on GitHub.

COLGATE UNIVERSITY

STATEMENT OF INTENT TO ESTABLISH A CONSORTIUM AGREEMENT

Title of Application: **Erosion, Transport, and Dispersion in Granular and Porous Media**
 Prime Grantee Institution: **Florida State University**
 Prime Grantee PD/PI: **Dr. Bryan Quaife**
 Funding Agency Name: **NSF**
 Agency Number (If Applicable): **2012560**

Sub- Awardee: **Colgate University**
13 Oak Drive
Hamilton, NY 13346-1398
 Sub-Awardee Duns #: **002253615**
 EIN **15-0532078**
 Congressional District: **NY-022**
 County **Madison**
 Principal Investigator: **Nick Moore**
 Phone Number: **315-228-7719**
 Email Address: **njmoore@colgate.edu**

Proposed Project Period: **August 1, 2022 – July 31, 2023**

	<u>Initial Proposed Amount</u>	<u>Total Proposed Amount</u>
Direct Costs:	\$14,756	\$14,756
Indirect Costs:	\$5,165	\$5,165
Total Costs:	\$19,921	\$19,921

The appropriate programmatic and administrative personnel of each institution involved in this grant application are aware of all applicable Federal regulations and policies, and will establish the necessary inter-institutional agreement(s) consistent with those policies.

As a consortium partner Colgate University agrees to provide the services defined in the above referenced proposal and in accordance with the attached budget.

Further, Colgate University certifies that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

Colgate University

Brittany Plumley

10/18/2022

Signature

Date

Brittany Plumley
 Associate Vice President & Controller
 315-228-7865
 315-228-7989 Fax