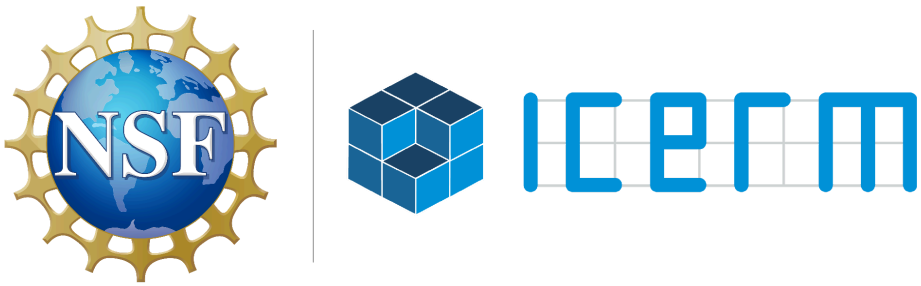


Institute for Computational and Experimental Research in Mathematics

Annual Report
May 1, 2025 – April 30, 2026

Brendan Hassett, Director, PI

Mathew Borton, Director of Information Technology
Jeffrey Hoffstein, Consulting Associate Director
Misha Kilmer, Deputy Director
Javier Gómez Serrano, co-PI
Caroline Klivans, co-PI
Benoit Pausader, co-PI (2020-26 award)
Jill Pipher, Director Emerita, co-PI
Kavita Ramanan, co-PI (2020-26 award)
Bjorn Sandstede, co-PI
Jenna Sousa, Associate Director of Finance and Administration
Nathaniel Whitaker, Associate Director
Ulrica Wilson, Associate Director

Mission

The mission of the Institute for Computational and Experimental Research in Mathematics (ICERM) is to support and broaden the relationship between mathematics and computation: specifically, to expand the use of computational and experimental methods in mathematics, support theoretical advances related to computation, and address problems posed by the existence and use of the computer through mathematical tools, research and innovation.

Core Programs and Events

The following grid lists ICERM's scheduled programs and events from May 1, 2025 through April 30, 2026 supported by the core NSF award and other grants. All programs and events were in person with some having the option for virtual attendance as well. The grand total of unique visits during this time frame was **2,109** for both in-person and virtual attendees. There were 2,066 in-person attendees and 13 registered virtual attendees. The unique visitors total for ICERM's core programs was **1,769**. Virtual participation was significantly lower than in any other post-pandemic year, while in-person visit rates are returning to pre-pandemic rates.

For reporting purposes, a visit is defined as "A contiguous period of time that a person is physically at or virtually interacting with ICERM" based on known arrival and departure dates, without reported gaps. The "Total #" column includes individuals who attended multiple events within a set period of time. An example is long-term visitors who attended several workshops during a semester program. The public lectures list the number of people registered to attend.

Type	Title	Start Date	End Date	UNIQUE Attendees	Total Attendees
Semester Program	Geometry of Materials, Packings and Rigid Frameworks	29-Jan-25	2-May-25	43	46
Topical Workshop	Uncertainty Quantification for Mathematical Biology	5-May-25	9-May-25	50	50

Collaborate @ICERM	Interpretable Algorithms for High-Dimensional Data Sets: Analysis, Computation, Machine Learning, Optimization, and Statistics	12-May-25	16-May-25	7	7
Topical Workshop	Links in Dimensions 3 and 4	12-May-25	16-May-25	93	93
Hot Topics Workshop	Applied Math in Statistics and Data Science Education	19-May-25	21-May-25	52	52
Topical Workshop	Scientific Machine Learning for Gravitational Wave Astronomy	2-Jun-25	6-Jun-25	78	78
Collaborate @ICERM	Chow Polynomials of Partially Ordered Sets	2-Jun-25	6-Jun-25	3	3
REUF Continuation Group	REUF Continuation Group - Numerical Ranges of Matrices	2-Jun-25	6-Jun-25	4	4
Collaborate @ICERM	Machine-learning Interatomic Potentials for Moire Materials	9-Jun-25	13-Jun-25	6	6
REUF Continuation Group	REUF Continuation Group - Gut-Brain Axis	9-Jun-25	13-Jun-25	5	5
Summer@ICERM	Summer@ICERM 2025: Building Useful Insights from Local Data	9-Jun-25	25-Jul-25	29	29
REUF	Research Experiences for Undergraduate Faculty (REUF)	9-Jun-25	13-Jun-25	26	26
Collaborate @ICERM	Stable Tamari Posets	16-Jun-25	20-Jun-25	5	5
Collaborate @ICERM	A Construction of Quantum Error-Correcting Codes from Classical Quasi-Cyclic Locally Recoverable Codes	16-Jun-25	20-Jun-25	3	3
Topical Workshop	Algebraic Points on Curves	23-Jun-25	27-Jun-25	53	53
REUF Continuation Group	REUF Continuation Group - Tournament Matrices	23-Jun-25	27-Jun-25	8	8
Collaborate @ICERM	Modeling the Impact of Human Movement on Malaria Immune Dynamics	23-Jun-25	27-Jun-25	6	6

Collaborate @ICERM	Computational Modeling of Biofilm Breakup	23-Jun-25	27-Jun-25	5	5
Hot Topics Workshop	Synthesizing Research On Ocean Surface Waves In The New Arctic	30-Jun-25	2-Jul-25	26	26
REUF Continuation Group	REUF Continuation Group - Combinatorial Games	30-Jun-25	3-Jul-25	4	4
Topical Workshop	LMFDB, Computation, and Number Theory (LuCaNT) 2025	7-Jul-25	11-Jul-25	78	78
Collaborate @ICERM	Arithmetic data for Delsarte K3 surfaces	7-Jul-25	11-Jul-25	7	7
GoGetMath	GoGetMath@ICERM: Summer Math Camp for High School Students	14-Jul-25	18-Jul-25	20	20
REUF Continuation Group	REUF Continuation Group - Graph Configuration	21-Jul-25	25-Jul-25	5	5
Topical Workshop	Innovative and Efficient Strategies for Stiff Differential Equations	21-Jul-25	25-Jul-25	43	43
Topical Workshop	Fostering Cross-Disciplinary Collaboration in Biology, Medicine, and Computational Science	28-Jul-25	1-Aug-25	58	58
Collaborate @ICERM	Finding Geometric and Topological Cores of Higher Graphs	28-Jul-25	1-Aug-25	6	6
Collaborate @ICERM	Noise is not Always Bad: A Case Study with the Randomized Kaczmarz Algorithm	28-Jul-25	1-Aug-25	5	5
REUF Continuation Group	REUF Continuation Group - Symmetric k-Varieties	4-Aug-25	8-Aug-25	5	5
Topical Workshop	Random Polynomials and their Applications	4-Aug-25	8-Aug-25	31	31
Collaborate @ICERM	Enumeration In Tubing Lattices	4-Aug-25	8-Aug-25	4	4
Collaborate @ICERM	VECINA	11-Aug-25	15-Aug-25	7	7
Collaborate @ICERM	Dynamics of Gentrification	11-Aug-25	15-Aug-25	3	3

Topical Workshop	Illustrating Mathematics: Reunion/Expansion	11-Aug-25	15-Aug-25	65	65
Topical Workshop	Graduate Workshop on Linear Algebra over Finite Fields and Applications	18-Aug-25	29-Aug-25	50	50
Semester Program	Categorification and Computation in Algebraic Combinatorics	3-Sep-25	5-Dec-25	73	74
Hot Topics Workshop	From Modeling to Learning with HPC	13-Sep-25	14-Sep-25	28	28
Semester Program Workshop	Category Theory, Combinatorics, and Machine Learning	15-Sep-25	19-Sep-25	47	107
Semester Program Workshop	Diagrammatic Categorification	20-Oct-25	24-Oct-25	43	107
Special Event	Modern Math Workshop 2025	29-Oct-25	1-Nov-25	7	7
Semester Program Workshop	Computation in Representation Theory	10-Nov-25	14-Nov-25	51	106
Hot Topics Workshop	Fluid Dynamics and Turbulence	22-Nov-25	23-Nov-25	41	41
Topical Workshop	Webs in Algebra, Geometry, Topology and Combinatorics	8-Dec-25	12-Dec-25	95	95
External Event	Summer@ICERM 2025 @ Joint Mathematics Meeting	4-Jan-26	8-Jan-26	9	9
Collaborate @ICERM	Identifiability Of Species Relationships From Quintet Concordance Factors	5-Jan-26	9-Jan-26	6	6
Collaborate @ICERM	Fingerprint Matching via topological Data Analysis	5-Jan-26	9-Jan-26	5	5
Topical Workshop	Extremal Black Holes and the Third Law of Black Hole Thermodynamics	5-Jan-26	9-Jan-26	47	47
Topical Workshop	Nonparametric Bayesian Inference - Computational Issues	12-Jan-26	16-Jan-26	57	57
Collaborate @ICERM	Toward a Juggling Analog for Kostant's Partition Function on the Exceptional Lie Algebras	12-Jan-26	16-Jan-26	5	5

Collaborate @ICERM	Computing The Expected Covering Radius Of Random Doubled Slit Tori	12-Jan-26	16-Jan-26	3	3
Semester Program	Stochastic and Randomized Algorithms in Scientific Computing: Foundations and Applications	20-Jan-26	24-Apr-26	44	44
Semester Program Workshop	Randomized Numerical Linear Algebra	2-Feb-26	6-Feb-26	74	115
Semester Program Workshop	Bayesian Inverse Problems and UQ	2-Mar-26	6-Mar-26	68	107
Hot Topics Workshop	Coding for Fault-Tolerant Quantum Computing	11-Apr-26	12-Apr-26	34	34
Semester Program Workshop	Simulation-Based Optimization with Applications	13-Apr-26	17-Apr-26	62	96
Topical Workshop	Nonlinear Waves: From Theoretical and Computational Advances to Experimental Observations	27-Apr-26	1-May-26	77	77

Participant Summaries by Program Type

The tables below display breakdowns of ICERM's confirmed participants by category during the reporting period for all funded programs. Each participant is represented once per unique visit regardless of the number of programs they attended during a visit. NOTE: "funded" refers to participants who had offered funding attached to their attendance.

ICERM Funded Participants

Program Type		Summer@ICERM	REUF Continuation Groups	Collaborate@ICERM Groups	Fall Semester '25					Spring Semester '26					Topical '25-'26														Hot Topics '25-'26					
					Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	Workshop 6	Workshop 7	Workshop 8	Workshop 9	Workshop 10	Workshop 11	Workshop 12	Workshop 13	Workshop 14	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	% of # Reporting
Geographical Point of Origin	Total Participants	35	33	84	68	40	42	46		41	61	62	51		67	48	85	66	47	61	38	54	28	59	44	80	44	45		30	16	21	27	33	
	US - Midwest	0	8	18	8	3	1	11	11.73%	5	10	3	5	10.70%	7	6	17	3	7	5	4	12	7	3	1	19	2	3	12.53%	5	0	3	4	1	10.24%
	US - Northeast	11	7	13	10	5	10	6	15.82%	12	11	12	12	21.86%	26	12	25	26	18	23	8	17	3	9	9	23	15	10	29.24%	15	3	5	7	9	30.71%
	US - South	15	10	20	1	8	3	5	8.67%	11	15	20	15	28.37%	12	14	24	6	5	5	7	15	6	20	17	6	1	14	19.84%	5	0	7	5	13	23.62%
	US - West	9	8	22	17	12	12	11	26.53%	4	11	16	13	20.47%	6	11	7	7	4	8	11	8	3	16	8	20	5	4	15.40%	3	7	2	7	7	20.47%
	Africa	0	0	1	0	0	0	0	0.00%	0	0	0	0	0.00%	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0.52%	0	0	0	0	0	0.00%
	Asia	0	0	0	6	5	3	6	10.20%	0	1	2	0	1.40%	4	0	2	3	2	0	3	2	2	0	0	3	2	0	3.00%	0	1	1	2	1	3.94%
	Canada	0	0	1	4	3	5	3	7.65%	0	0	2	0	0.93%	2	1	1	4	1	2	0	0	0	0	0	3	3	1	2.35%	0	2	0	0	0	1.57%
	Europe	0	0	7	11	3	7	2	11.73%	9	12	7	6	15.81%	5	3	9	17	9	16	5	0	7	10	7	4	11	10	14.75%	1	1	3	2	2	7.09%
	Latin & South America	0	0	2	5	1	0	0	3.06%	0	0	0	0	0.00%	1	0	0	0	1	0	0	0	0	1	2	0	5	3	1.70%	1	0	0	0	0	0.79%
	Oceania	0	0	0	6	0	1	2	4.59%	0	1	0	0	0.47%	0	1	0	0	0	2	0	0	0	0	0	2	0	0	0.65%	0	2	0	0	0	1.57%

All Participants (ICERM funded and Non-ICERM funded)

Program Type		Summer@ICERM	REUF Continuation Groups	Collaborate@ICERM Groups	Fall Semester '25					Spring Semester '26					Topical '25-'26														Hot Topics '25-'26					
					Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	Workshop 6	Workshop 7	Workshop 8	Workshop 9	Workshop 10	Workshop 11	Workshop 12	Workshop 13	Workshop 14	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	% of # Reporting
Geographical Point of Origin	Total Participants	29	33	87	73	47	43	51		44	74	68	62		51	94	78	54	80	43	59	31	68	50	95	50	57	78		52	26	28	42	36	
	Domestic	29	33	76	40	33	27	38	64.49%	35	58	57	55	83.33%	46	80	50	41	54	34	57	21	56	39	81	27	43	62	77.82%	50	18	24	38	33	88.59%
	Foreign	0	0	11	33	14	16	13	35.51%	9	16	11	7	16.67%	5	14	28	13	26	9	2	10	12	11	14	23	14	16	22.18%	2	8	4	4	3	11.41%

ICERM Funded Speakers

Program Type		Fall Semester '25				Spring Semester '26				Topical '25-'26																Hot Topics '25-'26					
		Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	Workshop 6	Workshop 7	Workshop 8	Workshop 9	Workshop 10	Workshop 11	Workshop 12	Workshop 13	Workshop 14	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	% of # Reporting
Geographical Point of Origin	Total Participants	9	13	9		20	20	20		11	15	16	16	19	22	25	21	27	12	22	22	29	24		12	8	10	7	8	
	US - Midwest	0	1	3	12.90%	1	1	4	10.00%	2	3	2	2	2	1	5	4	1	1	6	2	3	4	13.52%	2	0	2	2	0	13.33%
	US - Northeast	2	5	2	29.03%	7	1	2	16.67%	3	2	7	6	8	3	5	3	4	3	5	11	5	8	25.98%	7	1	2	3	4	37.78%
	US - South	1	1	1	9.68%	3	1	3	11.67%	4	5	0	1	1	3	8	4	8	6	1	0	8	5	19.22%	3	0	2	0	2	15.56%
	US - West	4	3	2	29.03%	5	10	6	35.00%	1	2	3	1	2	8	5	3	9	0	4	3	2	2	16.01%	0	4	1	1	0	13.33%
	Africa	0	0	0	0.00%	0	0	0	0.00%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0	0	0	0	0	0.00%
	Asia	1	0	0	3.23%	0	0	0	0.00%	0	0	0	1	0	2	2	2	0	0	2	0	0	2	3.91%	0	1	1	0	1	6.67%
	Canada	1	1	0	6.45%	0	2	0	3.33%	0	0	2	1	2	0	0	0	0	0	2	1	1	1	3.56%	0	1	0	0		2.22%
	Europe	0	2	0	6.45%	3	5	5	21.67%	1	3	2	3	4	5	0	5	4	2	2	3	8	2	15.66%	0	1	2	1	0	8.89%
	Latin & South America	0	0	0	0.00%	0	0	0	0.00%	0	0	0	1	0	0	0	0	1	0	0	2	2	0	2.14%	0	0	0	0	1	2.22%
	Oceania	0	0	1	3.23%	1	0	0	1.67%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0	0	0	0	0	0.00%

All Speakers (ICERM funded and Non-ICERM funded)

Program Type		Fall Semester '25				Spring Semester '26				Topical '25-'26																Hot Topics '25-'26					
		Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	Workshop 6	Workshop 7	Workshop 8	Workshop 9	Workshop 10	Workshop 11	Workshop 12	Workshop 13	Workshop 14	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	% of # Reporting
Geographical Point of Origin	Total Participants	9	13	9		20	20	20		12	15	18	17	22	23	26	21	30	12	23	23	31	26		15	8	10	8	8	
	Domestic	7	10	8	80.65%	16	13	15	73.33%	11	12	13	11	14	16	24	14	25	10	16	16	20	21	74.58%	15	5	7	7	6	81.63%
	Foreign	2	3	1	19.35%	4	7	5	26.67%	1	3	5	6	8	7	2	7	5	2	7	7	11	5	25.42%	0	3	3	1	2	18.37%

ICERM Funded Postdocs

Program Type		Summer@ICERM	REUF Continuation Groups	Collaborate@ICERM Groups	Fall Semester '26					Spring Semester '26					Topical '25-'26													Hot Topics '25-'26					
					Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	Workshop 6	Workshop 7	Workshop 8	Workshop 9	Workshop 10	Workshop 11	Workshop 12	Workshop 13	Workshop 14	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	% of # Reporting
Geographical Point of Origin	Total Participants				16	4	11	9		8	4	11	9		9	18	23	14	19	2	7	5	3	5	14	7	3	7		0	1	4	6	10	
	US - Midwest	0	0	2	4	0	0	4	20.00%	1	0	0	4	15.63%	1	4	2	3	2	2	2	1	0	0	2	0	0	3	16.18%	0	0	1	0	1	9.52%
	US - Northeast	0	0	3	3	1	4	0	20.00%	4	1	4	0	28.13%	2	4	6	5	5	0	4	0	0	0	6	1	1	2	26.47%	0	0	1	2	4	33.33%
	US - South	0	0	2	0	1	0	0	2.50%	0	1	0	0	3.13%	2	4	2	0	1	0	1	0	2	2	1	1	1	0	12.50%	0	0	1	1	3	23.81%
	US - West	0	0	6	5	0	1	1	17.50%	1	0	1	1	9.38%	4	2	4	1	0	0	0	2	1	1	3	0	1	1	14.71%	0	1	1	1	1	19.05%
	Africa	0	0	0	0	0	0	0	0.00%	0	0	0	0	0.00%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0	0	0	0	0	0.00%
	Asia	0	0	0	1	1	1	1	10.00%	0	1	1	1	9.38%	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1.47%	0	0	0	1	0	4.76%
	Canada	0	0	0	0	1	4	2	17.50%	0	1	4	2	21.88%	0	1	2	0	0	0	0	0	0	0	1	0	0	1	3.68%	0	0	0	0	0	0.00%
	Europe	0	0	2	3	0	1	1	12.50%	2	0	1	1	12.50%	0	3	7	5	10	0	0	1	0	2	1	3	0	0	23.53%	0	0	0	1	1	9.52%
	Latin & South America	0	0	0	0	0	0	0	0.00%	0	0	0	0	0.00%	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.74%	0	0	0	0	0	0.00%
	Oceania	0	0	0	0	0	0	0	0.00%	0	0	0	0	0.00%	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.74%	0	0	0	0	0	0.00%

All Postdocs (ICERM funded and Non-ICERM funded)

Program Type		Summer@ICERM	REUF Continuation Groups	Collaborate@ICERM Groups	Fall Semester '26					Spring Semester '26					Topical '25-'26													Hot Topics '25-'26					
					Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	Workshop 6	Workshop 7	Workshop 8	Workshop 9	Workshop 10	Workshop 11	Workshop 12	Workshop 13	Workshop 14	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	% of # Reporting
Geographical Point of Origin	Total Participants	0	0	16	17	5	11	9		9	12	11	7		9	18	27	17	22	4	10	6	3	5	18	7	3	11		3	4	5	7	9	
	Domestic	0	0	14	13	2	5	5	48.00%	7	9	9	7	83.33%	9	14	16	12	10	4	10	3	3	3	16	2	3	10	71.88%	3	3	5	5	8	85.71%
	Foreign	0	0	2	4	3	6	4	52.00%	2	3	2	0	87.50%	0	4	11	5	12	0	0	3	0	2	2	5	0	1	28.13%	0	1	0	2	1	14.29%

ICERM Funded Graduate Students

Program Type		Summer@ICERM	REUF Continuation Groups	Collaborate@ICERM Groups	Fall Semester '25					Spring Semester '26					Topical '25-'26													Hot Topics '25-'26					
					Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	Workshop 6	Workshop 7	Workshop 8	Workshop 9	Workshop 10	Workshop 11	Workshop 12	Workshop 13	Workshop 14	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	% of # Reporting
	Total Participants	0	1	16	4	16	12	18		8	21	22	11		7	42	28	10	18	6	4	10	10	24	26	15	10	17		0	3	1	9	6	
Geographical Point of Origin	US - Midwest	0	0	3	1	1	0	3	10.00%	0	4	0	0	6.45%	0	9	1	0	1	1	1	2	1	0	6	0	0	1	10.85%	0	0	0	2	0	10.53%
	US - Northeast	0	0	3	0	1	2	3	12.00%	1	3	6	4	22.58%	2	14	14	3	7	1	3	0	1	6	6	5	2	9	34.43%	0	1	1	1	1	21.05%
	US - South	0	0	2	0	2	0	1	6.00%	2	7	11	4	38.71%	3	10	2	0	1	2	0	1	0	8	2	0	5	2	16.98%	0	0	0	1	3	21.05%
	US - West	0	1	6	2	9	7	7	50.00%	2	1	5	2	16.13%	1	4	1	0	5	1	0	0	1	6	11	2	2	2	16.98%	0	1	0	5	2	42.11%
	Africa	0	0	0	0	0	0	0	0.00%	0	0	0	0	0.00%	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.94%	0	0	0	0	0	0.00%
	Asia	0	0	0	0	0	1	1	4.00%	0	0	0	0	0.00%	0	2	2	0	0	1	0	0	0	0	0	0	0	1	2.83%	0	0	0	0	0	0.00%
	Canada	0	0	0	0	1	0	1	4.00%	0	0	0	0	0.00%	0	0	1	0	0	0	0	0	0	0	0	2	0	0	1.42%	0	0	0	0	0	0.00%
	Europe	0	0	2	1	1	1	1	8.00%	3	6	0	1	16.13%	1	3	7	3	4	0	0	1	2	3	0	6	1	0	14.62%	0	0	0	0	0	0.00%
	Latin & South America	0	0	0	0	1	0	0	2.00%	0	0	0	0	0.00%	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.47%	0	0	0	0	0	0.00%
	Oceania	0	0	0	0	0	1	1	4.00%	0	0	0	0	0.00%	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.47%	0	1	0	0	0	5.26%

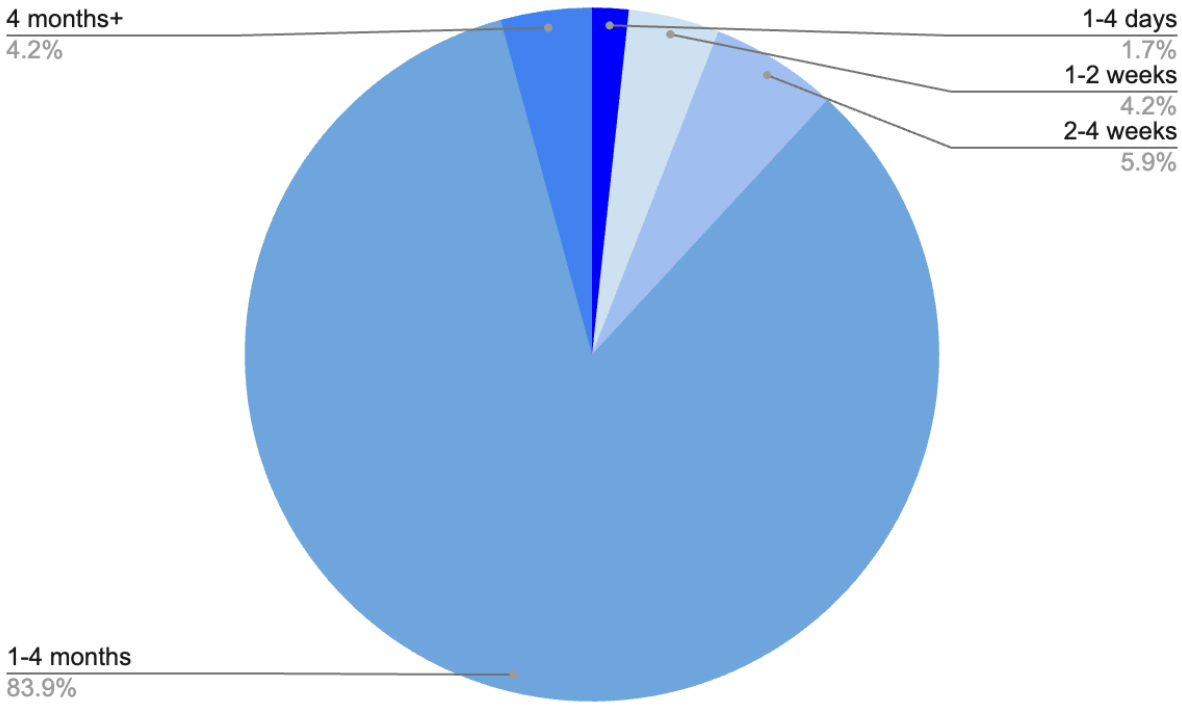
All Graduate Students (ICERM funded and Non-ICERM funded)

Program Type		Summer@ICERM	REUF Continuation Groups	Collaborate@ICERM Groups	Fall Semester '25					Spring Semester '26					Topical '25-'26													Hot Topics '25-'26					
					Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Semester Program	Workshop 1	Workshop 2	Workshop 3	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	Workshop 6	Workshop 7	Workshop 8	Workshop 9	Workshop 10	Workshop 11	Workshop 12	Workshop 13	Workshop 14	% of # Reporting	Workshop 1	Workshop 2	Workshop 3	Workshop 4	Workshop 5	% of # Reporting
	Total Participants	0	1	17	4	17	12	20		8	24	25	15		8	47	31	8	22	7	4	5	5	25	29	18	14	18		2	5	1	16	6	
Geographical Point of Origin	Domestic	0	1	15	3	14	9	16	79.59%	5	18	25	13	87.50%	7	41	21	5	17	6	4	4	3	21	27	9	13	15	80.08%	2	4	1	16	6	96.67%
	Foreign	0	0	2	1	3	3	4	20.41%	3	6	0	2	12.50%	1	6	10	3	5	1	0	1	2	4	2	9	1	3	19.92%	0	1	0	0	0	3.33%

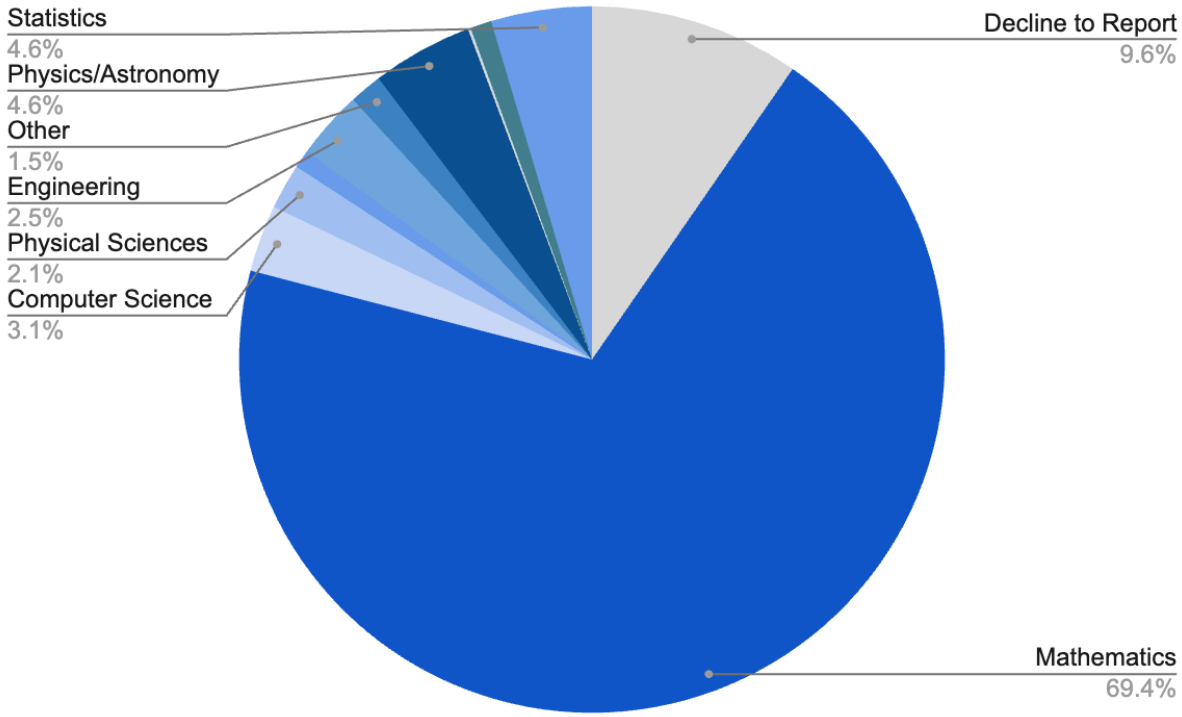
Additional Participant Data

The charts below display breakdowns of ICERM's confirmed NSF-funded participants by category during the reporting period for all funded programs. Each participant is only reflected once per chart regardless of the number of programs they attended.

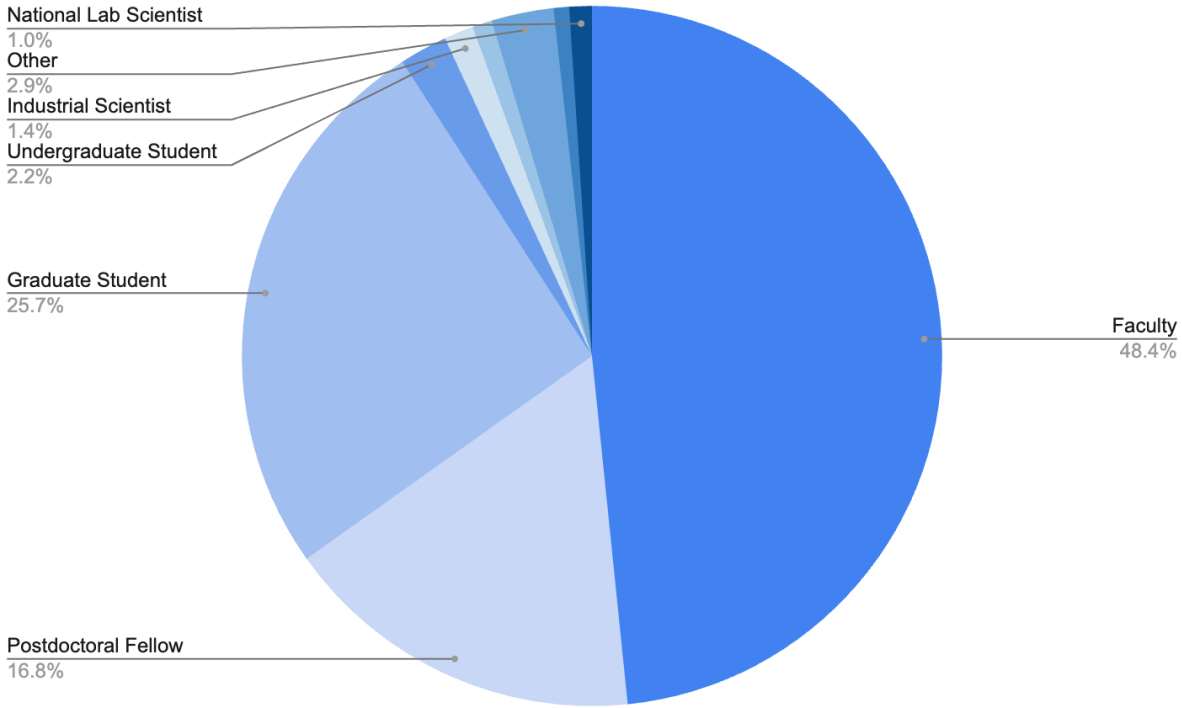
Semester Program Length of Stay



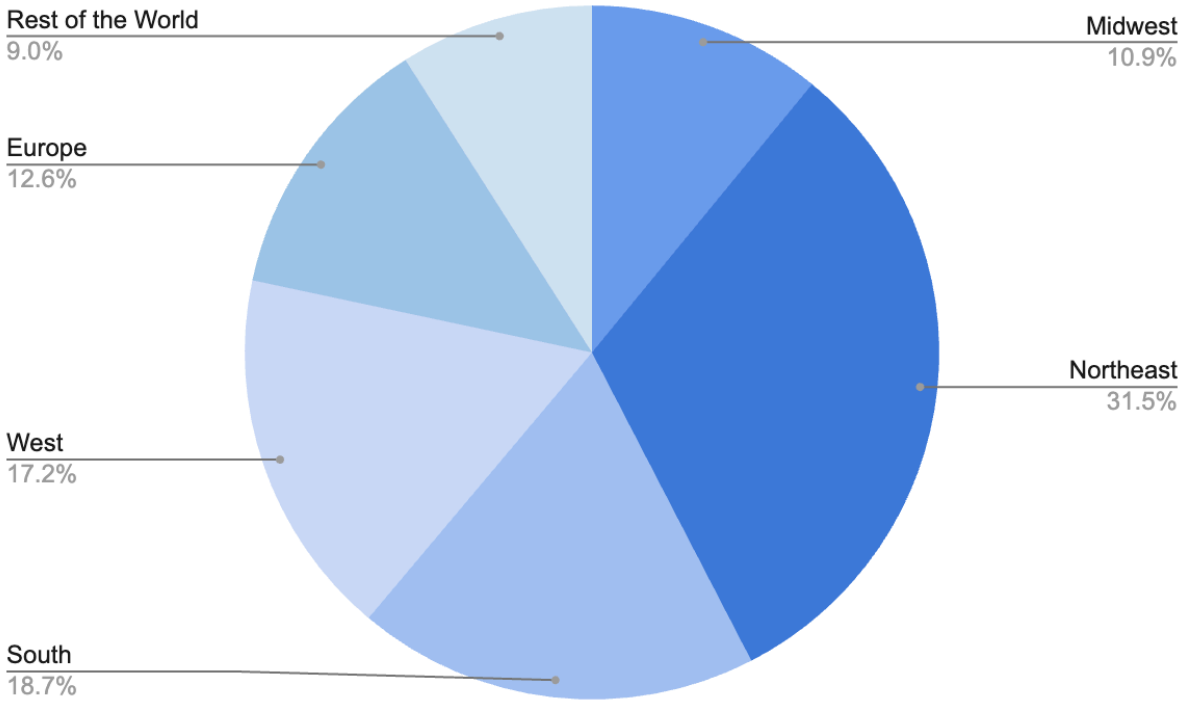
Primary Field of Interest



Position



U.S. vs. Foreign-Based Participants



"Rest of the World" category includes Africa, Asia, Canada, Latin and South America, and Oceania.

Notable Accomplishments

Workshop Highlights

On April 11-12, 2026, ICERM hosted the Hot Topic Workshop Coding for Fault-Tolerant Quantum Computing. Fault tolerance is essential for reliable quantum computation because quantum information (qubits) is inherently fragile. This event focused on two approaches to advance fault-tolerant quantum computing: quantum low-density parity-check (qLDPC) codes and the Clifford hierarchy. It remains an open question how to employ these constructions to achieve provably strong performance in practical (finite-length) settings and to describe decoding failures. Robert Calderbank (Duke University) spoke on "Quantum Computing and Cellular Phones": how the geometry of the Heisenberg-Weyl group connects the world of quantum computing and can be used to construct low-complexity signal processing algorithms that might find application in 6G wireless systems. Theodore Yoder (IBM Quantum) presented "Fail fast: techniques to probe rare events in quantum error correction": Building on existing approaches to this problem, he discussed three complementary techniques to characterize the rare-event regime for general qLDPC codes under circuit noise.

We also hosted two Hot Topics workshops on complementary themes. September 2025's From Modeling to Learning with HPC focused on the interaction between AI computation, scientific computation, and supercomputer architecture. The application of machine learning to science

and engineering has created a huge demand for performance and associated storage. Lower levels of the software stack created for simulation have proved immediately useful for machine learning at scale. However, higher levels of the simulation software have not yet fulfilled their potential to lift the dominant algorithms for machine learning and inference today above relatively "brute force" implementations, resulting in massive costs for facilities and energy. On the other hand, hardware optimized for machine learning applications possesses yet unrealized potential for traditional simulation. Applications included Digital Twins and predicting plasma instability in tokamaks. The second workshop, Fluid Dynamics and Turbulence, explored recent breakthroughs in the analysis of fluid equations, such as the Navier-Stokes and Euler equations, addressing fundamental questions of well-posedness, singularity formation, stability, and anomalous energy dissipation. Cutting-edge mathematical techniques included anomalous dissipation, convex integration, optimal transport, and regularity theory for partial differential equations. A highlight was a new class of self-similar implosion solutions for the full compressible Euler equations presented by Jiajie Chen (University of Chicago) and Vlad Vicol (NYU).

In May 2026, Richard Evan Schwartz published a paper that drew on his discussions at a 2019 ICERM program. The paper, in Proceedings of the National Academy of Sciences (PNAS), detailed the discovery of an 8-vertex origami torus, which solves the minimum vertex problem for origami tori. An origami torus is a finite union of triangles in space whose union is an embedded topological torus which is intrinsically flat. Schwartz learned about the minimum vertex problem in 2019 from extensive talks at ICERM with Alba Malaga and Samuel Lelievre. In addition to Schwarz's PNAS paper, coverage appeared in articles in Scientific American, Science News, and the German publication Spektrum, as well as the Simons Foundation annual report.

Fall 2025 Semester Program

ICERM's Fall 2025 semester program, Categorification and Computation in Algebraic Combinatorics, has been our most popular program in recent years, with 72 long-term visitors and workshops that exceeded 100 participants. One reason is that the program attracted thought leaders at the interface of representation theory and modern computation, including Terence Tao (UCLA), Lauren Williams (Harvard; 2025 MacArthur Fellow), and Geordie Williamson (University of Sydney). The program has active groups exploring connections with machine learning tools and formalization via Lean. For example, Jordan Ellenberg (University of Wisconsin-Madison) helped pure mathematicians explore FunSearch - a machine-learning tool developed by Google DeepMind with the intention of producing interesting mathematical algorithms - and deployed it on problems of interest to people at the conference.

Spring 2026 Semester Program

ICERM's Spring 2026 semester program, Stochastic and Randomized Algorithms in Scientific Computing: Foundations and Applications, started January 20. Stochastic and randomized algorithms have already made a tremendous impact in areas such as numerical linear algebra (where matrix sketching and randomized approaches are used for efficient matrix approximations), Bayesian inverse problems (where probabilistic approaches are used to define

priors and for posterior sampling), and machine learning (where stochastic optimization methods are used to efficiently train network models). This program addresses the development of new mathematical approaches, convergence results, next-generation hardware, statistical guarantees, and error bounds, as well as the integration of these tools in scientific applications at scale.

Report on ICERM operations

Program Management Team

During this reporting period, ICERM operated at peak capacity to support an exceptionally high volume of programming. Virtual participation dropped to near zero as program organizers overwhelmingly emphasized the irreplaceable value of full, in-person engagement. While ICERM maintains its flexible policy allowing up to 20% virtual or hybrid speakers at organizer discretion, scientific leaders and participants overwhelmingly prioritized on-site attendance.

The institute maintained a dense schedule of programs throughout 2025–2026. Often running overlapping offerings, including parallel Collaborate@ICERM groups, Summer@ICERM, and multiple Topical Workshops. This continually stretched staff bandwidth and physical facility limits. ICERM leadership and staff worked dynamically to manage space constraints, streamline operational workflows, and ensure equitable support across all running programs.

Operational challenges were compounded by staffing constraints, particularly the absence of a dedicated full-time Communications Specialist throughout the reporting year. To prevent disruption to institute communications and participant support, ICERM relied on cross-team coverage. Building on the temporary transition of social media and research highlight duties to the IT team, staff members stretched across roles. Despite these lean operational conditions, the team demonstrated remarkable resilience, successfully delivering a demanding program calendar without compromising the quality of the participant experience.

Information Technology

AV and Video Conferencing

All meeting spaces in ICERM have remote conferencing capabilities and can host in-person, hybrid or remote sessions. ICERM also has an auxiliary portable AV system to make use of large spaces without integrated AV equipment.

Endpoint Computing

ICERM has an “flexible endpoint” solution for desktop computing; due to low participant usage rates, we no longer put terminals/thin clients on each desktop. ICERM supplies a monitor, keyboard, and mouse for each desk. The IT group maintains a pool of 15 laptops available for participant use on a temporary basis, as well as an array of cables, connectors, and adapters. This strategy optimizes resource allocation by reducing hardware expenditures and maintenance overhead.

Compute and Software Resources

ICERM continues to leverage Brown's resources for software licensing and delivery and for high performance computing. ICERM also provides access to commonly used Software as a Service (SaaS) offerings such as Overleaf and CoCalc. ICERM is augmenting its technology portfolio by supporting commercially available cloud compute resources. These systems will provide the institute with a high level of flexibility and allow us to better support a broader range of programs and participants.

Web Services and Application Development

ICERM continues to iteratively develop Cube, its institute management application, in an effort to minimize administrative overhead for staff, improve the user experience for participants, and enhance reporting capabilities. Recent projects include integrating invitation preparation into Cube, increasing consistency with our internal ledger of financial commitments to participants. The technology stack has also been revised to reduce complexity and increase efficiency and security.

Semester Programs

Since its inaugural semester program in September 2011, a large portion of the institute's activity has taken place in the context of semesterlong thematic programs together with their associated workshops. ICERM encourages proposals for programs that support its mission "to foster and broaden the relationship between mathematics and computation." The institute is open to proposals from any area of the mathematical sciences. Both pure and applied fields may benefit from the positive feedback between computation and theory that ICERM promotes. ICERM directors help proposal writers expand their ideas within the context of our mission; it is an iterative process involving many conversations with ICERM directors and proposal drafts in response to feedback from directors and ICERM's boards. Fine-tuning may occur after the event is announced publicly.

Semester Program Process

ICERM's Scientific Advisory Board (SAB) meets annually in November and schedules conference calls as needed throughout the year. The fall 2025 annual meeting and a subsequent conference call in May 2026 resulted in the selection of Semester Programs and Topical Workshops through fall 2028.

The semester program selection process follows these steps:

1. Solicitation of Proposals

ICERM hosts two semester programs per year. Each has organizers and long-term participants who are expected to be in residence for the majority of the semester. Semester programs typically incorporate three weeklong associated workshops.

Semester Program Full Proposal Requirements

A semester program proposal should be 6-10 pages and contain:

- List of five to 10 organizers, including the main contact for the organizing committee
- Short abstract of the program's basic goals and underlying philosophy
- Description of the program area/theme and central scientific challenges, written for a general mathematical audience
- Description of the experimental and computational aspects of the program
- List of eight to 10 high-priority senior scientists likely to visit ICERM for a month or more
- Ranked list of 20+ potential long-term participants who will help form a critical mass for the scientific program
- Description of three proposed workshops, including potential organizers, if known
- Description of a 2-3 day opening event that will survey guiding problems or introduce key computational or experimental methodologies
- Concrete plans for involving and mentoring graduate students, postdocs, and early-career mathematicians in the program

Deadline and Review Process
Proposals are submitted to the ICERM director. Annual target deadlines are October 1 and May 1. ICERM directors and the Scientific Advisory Board (SAB) review all proposals. Proposers receive feedback within a month of the SAB meeting.

2. Proposal Selection

The SAB approves the semester programs. The deadline for revised proposals is a week prior to the annual November SAB meeting. When a proposal is accepted, the organizers are provided with a planning timeline; this is especially important for semester programs, which run two or more years after approval. . The “high priority” list of senior scientists are contacted and invited to participate immediately upon SAB approval. Program dates are scheduled with details posted on the ICERM website and various online math organization calendars for SIAM, AMS, National Math Institutes, and/or workshop ads are placed in appropriate publications if recommended by the organizers and directors. ICERM reserves some funds for applicants (non-invitees) to the program.

From this point on, organizers are involved in making decisions on the following: ICERM postdoc selection; applications for long-term visitors, graduate students, and workshop participants; mentoring of students and postdocs (an institute director assists the organizers with mentor coordination). Members of the directorate make the final decisions on all invitations. A designated organizer assists ICERM staff by providing appropriate program images for web and print ads and will review marketing materials.

3. Selection of Long-term Visitors/Research Fellows

The organizers propose a ranked list of 20 to 30 research fellows. ICERM directors approve and/or suggest additions or re-rankings. The standard model for long-term participation for senior faculty is through paid leaves such as sabbatical.

4. Offers to Research Fellows

Once the list of research fellows has been finalized and funding determined, an invitation is sent to each. The invitation describes the program and outlines the support to be provided and it includes language regarding Brown University's "Code of Conduct" on sexual harassment, discrimination, and other unprofessional behaviors. Using its Cube database, ICERM tracks all interactions with research fellows.

5. Semester Workshops

Semester program organizers recommend organizers for each of the three to four workshops, taking into account feedback from ICERM's Scientific Advisory Board and responsible directors. The organizers propose an initial ranked list of 20-25 possible speakers and a list of 10 alternates. The ICERM Directorate approves and/or suggests additions or re-rankings in consultation with assigned SAB members. Formal invitations are sent by ICERM staff describing the program and outlining the support to be provided to those who indicate an interest. During this reporting cycle, ICERM updated all of its workshop invitations to include language regarding Brown University's "Code of Conduct" on sexual harassment, discrimination, and other unprofessional behaviors. A designated workshop organizer assists ICERM staff by providing appropriate program images for the workshop's web and will review marketing materials.

6. Application Process

Once the organizers and directors agree there is enough critical mass in terms of confirmed long-term visitors and/or workshop speakers, the online application for that particular program is opened on the ICERM website. All applications are stored in the institute's Cube database (see also the "Recruiting and Selection of ICERM-Funded Postdocs" later in this report). The ICERM postdoctoral fellow applicants who were not hired via MathJobs.org are alerted that the ICERM postdoc positions have closed and that they should apply online for partial support to attend as a participant if they are still interested.

7. Applicant Selection

Program organizers can view the applicants and their supporting documents as well as prioritize them within Cube. A member of the ICERM directorate reviews the prioritized list, re-ranks as appropriate and makes the final selections, taking into consideration the remaining space in the program, participant support requested, and whether or not the applicant is a young researcher who has an advisor already participating in the program. ICERM staff then updates the applicant about their status and any support they are eligible for, as appropriate.

Financial Decisions for Semester Programs

Financial decisions are made by ICERM directors based on input from and discussions with organizers. For a typical program, ICERM provides travel and lodging support for 5-10 organizers (at least a month in residence, with some for the full semester); 20-30 long-term participants (4+ weeks); 1 Institute and 5 Semester postdoctoral fellows (on stipends); 60 short-term participants (1-4 weeks); 10-15 graduate students (6+ weeks); and workshop

attendees. ICERM helps essential long-term participants negotiate sabbatical leaves or teaching releases to foster their participation.

In response to feedback from the ICERM Board of Trustees, a research fellowship support opportunity was advertised to the mathematical community as well as specific outreach sent to attendees of upcoming programs. The funding is available for fellowships to support faculty who attend one of its semester programs. These are often used to cover teaching release so that participants can be in residence throughout a semester program. ICERM particularly welcomed applications from those not based at R1 research universities. The program organizers for the relevant program encourage participants to request the support, identify participants whose attendance would be critical to the success of the program, and are consulted to ensure an applicant's background fits with the program.

Opening, Closing, and Related Events

Semester program opening and closing events are tailored to each program. Here are some examples of planned events during semester programs.

Opening event(s)
During the first week of program and can include:

- Opening reception
- 10-15 minute introductory presentations by the postdocs and grad students, designed to get everyone acquainted
- Talks related to upcoming workshops
- IT tutorial led by ICERM's IT staff

Weekly Seminar non-workshop weeks

- The weekly seminar includes talks by visitors in residence at ICERM. Program organizers are provided with names and dates to facilitate scheduling.

Mini-Series (Optional)

- Mini-courses or other multi-session events are encouraged.

Research Clusters (Optional)
A research cluster takes place during a semester program and is an independently organized research group activity in a focused subfield of that semester program.

A typical research cluster lasts at least 10 days, and as long as 4-6 weeks. It focuses on immediate progress on a major problem or on several problems of significance in the field of the program. In addition to the invited participants, interested faculty, postdocs or graduate students in residence at ICERM may participate in the research cluster.

The activity period begins with a collection of tutorials or a short workshop. The research activities, planned by the organizers, may consist of teamwork, daily/weekly seminars, and closing presentations. In collaboration with an ICERM Director, Research Cluster organizers develop a list of 6-15 key scientists to form the core cohort of the cluster.

Prior to each of semester workshops (optional)

- Full-day tutorials the Thursday and Friday the week before each workshop
- Tutorials are given by long-term visitors to the program

During Semester Workshops

- Workshops last one week and usually consist of 45-50 minute talks with 10 minutes of Q&A.
- Sometimes one afternoon is left open for collaborations and small groups.
- A poster session is scheduled early in the workshop week.
- Networking opportunities within workshops and semester programs, e.g., opportunities for participants to come together for lunchtime discussions (optional)

Non-workshop weeks

- Lectures occur through either mini courses, research seminars, special talks, and/or computational working group meetings
- Early-Career Researcher Seminar, where graduate students and postdocs meet without faculty and discuss scientific questions
- Postdocs and grad students are mentored throughout the program, both informally and with formal professional development seminars and meetings

Final Event

During the final week of the event, ICERM hosts a closing lunch bringing together program organizers, participants, and Directors. These are an opportunity to discuss future initiatives like reunion workshops and Collaborate@ICERM groups building on the collaborations developed over the semester.

2025-2026 Semester Programs

Fall 2025

Categorification and Computation in Algebraic Combinatorics

Sep 3 - Dec 5, 2025

Organizing Committee:

Chris Bowman, University of York
Nicolle Gonzalez, UC Berkeley
Kyu-Hwan Lee, University of Connecticut
Nicolas Libedinsky, Universidad de Chile
Rosa Orellana, Dartmouth College
Greta Panova, University of Southern California
Anne Schilling, University of California, Davis
Jamie Vicary, University of Cambridge
Adam Wagner, Worcester Polytechnic Institute
Lauren Williams, Harvard University

Program Description:
Algebraic combinatorics can be thought of as "counting things" and representation theory can be thought of as the "study of symmetry." The notions of counting and symmetry are all-pervasive in the natural sciences. Thus, the pure mathematical questions we consider often have ramifications across fields including physics, quantum theory, chemistry, and cryptography.

The past decade has been one of the most exciting and fruitful times in the history of combinatorics and representation theory. One of the overarching themes in this story is the search for richer structures which secretly underpin the classical problems in the field — these might manifest themselves as algebraic or geometric structures, or even as diagrammatic categories.

The discovery of these richer structures has led to the recent rise and fall of some of the most famous conjectures in the history of combinatorics and representation theory: the Macdonald constant term conjectures, the shuffle conjecture, the Lusztig conjecture, the Kazhdan–Lusztig positivity conjecture. Further afield, Crane conjectured that categorification should provide the correct setting for a theory of quantum gravity.

This Semester Program is driven by the need to interweave machine learning, graphical computer software, and computability perspectives and techniques into the study of these diagrammatic, algebraic, and geometric structures.

The list of all long-term visitors to the Fall 2025 Semester Program as well as the participant list for the affiliated workshops can be found in Appendix A.

Here follows a sample of the most substantive comments from long-term visitors:
Some long-term visitors' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *"I learned SO MUCH over the course of this semester! The talks taught me a lot about incorporating machine learning into my research, and also about some new techniques and strategies to try theoretically as well as computationally. I started several new projects. The amazing collaborative space was really key. For example, I came across a paper that was useful to one project, so I asked some of the authors (who were also at ICERM for the semester) to tell me about it and we ended up working on a related project that led to a paper we are close to finishing!*
- *There were many talks and tutorials on the use of AI for math research that I never would have learned about otherwise. I have a better understanding of how to ask the computer questions and refine them to get ideas on solving problems or looking for patterns.*
- *The ability to play with modern AI methods (in particular Funsearch and AlphaEvolve) was potentially transformative.*

Some long-term visitor comments for "Briefly describe program highlights":

- *The sheer number of brilliant people and the exceptionally welcoming atmosphere made the experience unique. The facilities are remarkably modern, the city is beautiful, and every setting for interaction (talks, meals, conferences, and informal discussions) was thoughtfully designed to bring people together. It was simply an ideal environment, offering every opportunity for us to grow as mathematicians. These were the best three months of research in my life, and I am incredibly grateful.*
- *The workshops were outstanding. The space and environment and support from the staff were perfect for fostering collaboration.*
- *To me the highlight was learning machine learning techniques and the realization that although progress has been made, it is still very difficult to make actual progress on hard problems with it. From a research perspective, we had an idea on how to approach a longstanding conjecture.*

Workshop 1: Category Theory, Combinatorics, and Machine Learning

Sep 15 - 19, 2025

Organizing Committee:
Chris Bowman, University of York
Kyu-Hwan Lee, University of Connecticut
Rosa Orellana, Dartmouth College
Anne Schilling, University of California, Davis
Adam Wagner, Worcester Polytechnic Institute

Program Description:
Can machines prove theorems? Can they have mathematical ideas? On one hand, category theory offers a formalism for axiomatising ideas from machine learning. On the other hand, mathematicians are excited about the prospect of utilising machine learning techniques to spot new patterns in vast swathes of combinatorial data and hence formulate new conjectures.

The purpose of this workshop is to bring together experts from across algebraic combinatorics, category theory, and machine learning in order to make headway on topics at the intersection of these fields.

Some workshop participants comments for “Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.”:

- *Several talks described successful experiments with using ML techniques in mathematics, and also with training mathematics students to explore interpretability methods in modern ML models. Inspired by them, I'm planning to attempt variations of these projects in undergrad research next semester.*
- *These were the very best talks on AI and math I have yet seen, and I have seen a lot. It was very helpful to learn what AI can and cannot do well when attacking computational problems, and what the state of the art is, in a convincing way. I am still not convinced to use it in my own research, but these talks led me to brainstorm which questions would make sense, and perhaps one day it would be sensible.*

- *This cross-disciplinary workshop was a hard one to pull off, but I think the organizers did a good job overall inviting a good mix of speakers. In particular, it was incredibly helpful to hear from people about what they have tried to do regarding Machine Learning in combination with theoretical math and I felt like I learned quite a bit!*

Some workshop participants' comments for "Briefly describe workshop highlights":

- *The chance to connect and share my research with established mathematicians"*
- *I learned a lot about machine learning techniques and how directly applicable they are to Combinatorics. Interacting with people with such broad skillsets was very useful.*
- *"The highlight was definitely learning about what has worked and what has not worked (or is yet to be done) applying ML to mathematics; it demystified some of the tools and made it seem more approachable.*

Workshop 2: Diagrammatic Categorification

Oct 20 - 24, 2025

Organizing Committee:
Jonathan Brundan, University of Oregon
Nicolle Gonzalez, UC Berkeley
Alvaro Martinez, Columbia University
Anna Romanov, University of New South Wales

Program Description:
Many classical results connecting representation theory and combinatorics can be succinctly understood through the concept of categorification. Two celebrated examples are Frobenius's 1900 theorem showing that the ring of symmetric functions is categorified by the representation theory of symmetric groups, and the Kazhdan-Lusztig conjecture which relates category O for a complex semisimple Lie algebra to the Hecke algebra of the corresponding Weyl group. In these and other examples, positivity properties observed at a combinatorial level are explained conceptually by the existence of a categorification. The original proofs of the Kazhdan-Lusztig conjecture found in 1981 were geometric in nature, involving perverse sheaves and D-modules on the underlying flag varieties. Elias and Williamson found an alternative, purely algebraic proof in 2014, exploiting a diagrammatic description of the monoidal category of Soergel bimodules.

The diagrammatic approach has its origins in the discovery of new quantum invariants of knots and links in the 1980s. Crane and Frenkel raised the idea of categorifying quantum groups, hence, link invariants, in the 1990s, and this vision prompted the development of powerful link homology theories such as Khovanov-Rozansky homology. The categorification of quantum groups involves Khovanov-Lauda-Rouquier algebras, which are often presented diagrammatically. They are a building block for Kac-Moody 2-categories, which categorify Lusztig's modified integral form for quantized enveloping algebra. There have been many remarkable developments in this direction in the last few years, including the introduction by Webster of more general algebras categorifying tensor products, DG versions of these algebras

which categorify Verma modules, and p-DG versions which are being used to categorify link invariants at roots of unity.

The field of diagrammatic categorification is still in its early stages, but it already has had a significant impact on more traditional mathematics. This workshop aims to unite both established experts and emerging scholars across various domains of diagrammatic categorification, including representation theory, combinatorics, and link homology.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *Many important recent developments in representation theory and related areas were presented during the conference. These ideas are very powerful and have the potential to be applied in other areas, which can foster collaborations and benefit many of the participants.*
- *It was great to learn about computational methods for computing modular represenations of the symmetric group.*
- *The conference gave me the opportunity to talk with various other researchers with similar interests as me. I learned a lot of useful things in these discussions, and also gave me ideas on how to develop further on some of my active projects.*

Some workshop participants' comments on "Briefly describe workshop highlights":

- *Honestly, this workshop had the highest density of people that I knew and was interested in of almost any workshop I've been to in years. There were too many people to talk to them all. It was a blast.*
- *I've learnt a lot from several talks, as well as had meaningful, several hours discussions with at least 3 people that are very useful to my current/future research. One of the discussions started after a lightning talk.*
- *The talks were fantastic. It was also wonderful that several senior researchers were in attendance even if not giving talks.*

Workshop 3: Computation in Representation Theory

Nov 10 - 14, 2025

Organizing Committee:
Greta Panova, University of Southern California
Jose Simental Rodriguez, Universidad Nacional Autónoma de México
Mike Zabrocki, York University

Program Description:
This workshop encompasses three major aspects of computation within Representation Theory and Algebraic Combinatorics. One concerns the development of efficient algorithms to compute

important quantities in order to understand and classify them better. Such problems include structure constants and representation theoretic multiplicities, mutation invariants in cluster algebras, computing dimensions of coinvariant rings, characters of finite-dimensional representations, coefficients of Kazhdan-Lusztig polynomials, web bases etc. This is closely related to understanding what optimality we could expect and in particular the computational complexity aspects of those problems. Their computational complexity class can also be used to understand the existence of combinatorial interpretations, in particular for major structure constants lacking positive formulas like Kronecker and plethysm coefficients. On the other hand, representation theory has seen important applications within computational complexity theory, in the context of Geometric Complexity Theory and Quantum Information Theory.

Last, but not least, we will discuss the collection of "experimental" data, which helps formulate conjectures, find counterexamples and understand the behavior for some of the problems listed above.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *I was able to meet awesome, really nice people. Some of whom took time to explain really cool things to me.*
- *Many of the talks were excellent and made ideas that I have often heard discussed clear to me for the first time! I appreciated the emphasis many speakers gave to examples, which was bolstered by the focus on computational methodologies.*
- *I had an opportunity to learn about state-of-the-art developments in several areas through many conversations. These conversations were made possible by the program at ICERM, and were motivated by the excellent selection of talks at the workshop.*

Some workshop participants' comments on "Briefly describe workshop highlights":

- *During two conversations with other participants, I was provided with a connection in the literature that I was unaware of, and which is crucial in my current research.*
- *The time and ability to work with researchers who I do not get to see often.*
- *Very excellent talks!*

Spring 2026

Stochastic and Randomized Algorithms in Scientific Computing: Foundations and Applications

January 20 - April 24, 2026

Organizing Committee:
Harbir Antil, George Mason University
Julianne Chung, Emory University

Petros Drineas, Purdue University
Youssef Marzouk, Massachusetts Institute of Technology
Agnieszka Miedlar, Virginia Tech
Arvind Krishna Saibaba, North Carolina State University

Program Description:
In many scientific fields, advances in data collection and numerical simulation have resulted in large amounts of data for processing; however, relevant and efficient computational tools appropriate to analyze the data for further prediction and decision-making are still in their infancy. To tackle these challenges, the scientific research community has developed and used probabilistic tools in at least two different ways: first, stochastic methods to model and quantify these uncertainties in applications where there is underlying uncertainty; second, in applications that may be inherently deterministic but randomness is used as an algorithmic tool to drastically reduce computational costs while retaining the high accuracy of classic approaches.

Stochastic and randomized algorithms have already made a tremendous impact in areas such as numerical linear algebra (where matrix sketching and randomized approaches are used for efficient matrix approximations), Bayesian inverse problems (where probabilistic approaches are used to define priors and for posterior sampling), and machine learning (where stochastic optimization methods are used to efficiently train network models).

The main goal of this program is to advance foundational research in stochastic and randomized methods for scientific computing and optimization, enabling their effective and widespread use in challenging applications. This includes the development of new mathematical approaches, convergence results, next-generation hardware, statistical guarantees, and error bounds, as well as the integration of these tools in scientific applications at scale. We also aim to create research and mentorship opportunities for researchers at all levels, including advanced undergraduate students, graduate students, postdocs, and senior scientists.

The list of all long-term visitors to the Spring 2026 Semester Program as well as the participant list for the affiliated workshops can be found in Appendix B.

Here follows a sample of the most substantive comments from long-term visitors:
Some long-term visitors' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *As someone who had some basic experience with the main topic of the semester, my stay at ICERM significantly deepened my understanding of many of its key concepts and surrounding areas. I greatly benefited from the talks and mini-tutorials in related areas, which allowed me to expand my perspective, learn new tools, and better appreciate the broader context of the field. I also benefited from the very lively atmosphere and the informal discussions with colleagues. I could not be happier with my stay at ICERM. I returned home with new ideas, fresh energy, and a renewed sense of motivation.*
- *I learnt a lot about randomized numerical linear algebra, which was an entirely new topic for me.*

- *The ICERM program provided an exceptional venue for frequent informal presentations, tutorials, and interactions. Through these things I learned a lot about research areas that are related but not directly aligned with my own. Such knowledge acquisition is crucial to the process of generating new ideas that bring together concepts from different areas.*

Some long-term visitors' comments on "Briefly describe program highlights":

- *Being able to be away from my usual institution, in a calm focused environment that provides uninterrupted thinking time, which is so critical in mathematics. Also, the people I met and their genuine enthusiasm for collaborative working.*
- *Naturally the three conferences included in the program were the most active periods, with lots of exciting talks and discussions. I also appreciated the working groups a lot, as they allowed us to form smaller research groups while remaining accessible to all participants.*
- *The ease of making in person connections with new colleagues in a very friendly environment, and with great support staff has been the biggest highlight of the program for me.I believe I have made professional and personal connections that will continue long after the end of the program.*

Workshop 1: Randomized Numerical Linear Algebra

Feb 2 - 6, 2026

Organizing Committee:
Haim Avron, Tel Aviv University
Petros Drineas, Purdue University
Anna Ma, University of California Irvine
Agnieszka Miedlar, Virginia Tech
Arvind Krishna Saibaba, North Carolina State University
Valeria Simoncini, Università di Bologna

Program Description:
This workshop will highlight the latest advances and emerging trends in the area of randomized numerical linear algebra (RandNLA). RandNLA uses randomization to reduce communication and computation costs in low-rank approximations, optimization, preconditioning, and other areas across Scientific Computing and Data Science. Key topics of interest to this workshop include sketching, sampling, stochastic rounding, and mixed precision computations to improve efficiency in linear and multilinear algebra, optimization, inverse problems and uncertainty quantification. We also aim to bring in new perspectives from high-dimensional probability and random matrix theory. By bringing together researchers from numerical analysis, theoretical computer science, and related fields, the workshop aims to bridge theory, practice, and applications.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic":

- *Some of the material presented was familiar to me, having read the papers of the people involved, but other was fairly new, so definitely adding to what I knew on the topic. Moreover, I was given some directions on specific methods from those who actually developed them.*
- *I had previously only little knowledge about how to incorporate randomization tools in algorithms, now I have seen many different possibilities and their advantages.*
- *I cannot imagine a better lineup of first-rate experts in this field. The atmosphere was very friendly and encouraging for collaboration. Everything worked great!*

Some workshop participants' comments on "Briefly describe workshop highlights"

- *This workshop was extremely valuable as it connected me with other professionals in the field. It provided insightful feedback on my work, highlighting areas for improvement and potential bottlenecks. The lectures were particularly helpful in building a solid understanding of recent developments in randomized linear algebra and exploring directions for future research.*
- *The participation of the leading figures on RNLA was just phenomenal. I have to give credit to the organizing committee for getting them together at this event.*
- *I have the feeling that I understand the state of the art of this field, and also the culture around it. Highlights include the moments of understanding how I can use the methodology in my research and teaching, and what is solid and what is hype.*

Workshop 2: Bayesian Inverse Problems and UQ

Mar 2 - 6, 2026

Organizing Committee:
Tan Bui-Thanh, University of Texas at Austin
Julianne Chung, Emory University
Joseph Hart, Sandia National Laboratories
Youssef Marzouk, Massachusetts Institute of Technology
Mirjeta Pasha, Virginia Tech
Daniel Sanz-Alonso, The University of Chicago
Erkki Somersalo, Case Western Reserve University

Program Description:
Inverse problems use experimental measurements to make inferences about parameters that describe mathematical models. The Bayesian approach to inverse problems models the unknown parameters as random variables and uses Bayes' rule to combine the likelihood with the prior distribution to make inferences about the parameters. A major theme of this workshop is to develop new algorithms for UQ in Bayesian inverse problems which then has broad-ranging applications in many areas of science and engineering, such as medicine, security, geosciences, and materials science. A related area of interest to this program, known as data assimilation, also has similar goals but typically involves dynamical models. Also of interest are other areas such as sensitivity analysis, reduced order/surrogate modeling, experimental design, and extreme events.

The focus of this workshop is on probabilistic approaches for Bayesian inverse problems and uncertainty quantification. The workshop aims to bring together applied mathematics and statistics researchers from related, yet often disparate, fields of inverse problems, data assimilation, sensitivity analysis, experimental design, and uncertainty quantification, where stochastic methods are required for sampling (e.g., posterior distributions) but randomization can play a crucial role in mitigating computational costs.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *It was very useful to get feedback from the community on what they perceive as potential advantages and shortcomings of adopting generative AI for solving inverse problems, both in terms of theory and methodologies, and how to balance the desire to be adventurous in our research with the need for caution and rigor.*
- *There are several ideas (both theoretical and computational) that I am interested in using for my research that appear to be completely unknown in my corner of inverse problems. Further, I feel comfortable reaching out to the people who presented these ideas in order to collaborate on how to tailor these ideas specifically to my research topics.*
- *The workshop helped broaden my understanding of recent computational and theoretical developments in Bayesian inverse problems. I found the talks and posters very helpful, and discussions with participants gave me useful perspectives and sparked some new ideas for my own research.*

Some workshop participants' comments on "Briefly describe workshop highlights":

- *The highlight for me was the opportunity to hear about recent theoretical and computational developments in Bayesian inverse problems and to have informal discussions with researchers working in related areas.*
- *Getting to meet so many top scholars in my field. Truly, I don't think I'll ever have an experience quite like this ever again where so many leaders in this field came together to discuss research. It was a great experience overall, but I loved being able to expand my professional network in this way.*
- *The highlight was the sense of community and the opportunity to get a better picture of the main research thrusts in the field.*

Workshop 3: Simulation-Based Optimization with Applications

Apr 13 - 17, 2025

Organizing Committee:
Harbir Antil, George Mason University
Matthias Heinkenschloss, Rice University
Brendan Keith, Brown University
Elizabeth Newman, Tufts University
Noemi Petra, University of California, Merced

Program Description:

Optimization is ubiquitous in science and engineering. In engineering, one may have to tackle optimization problems constrained by large systems, and in machine learning, one tackles optimization problems with large-scale datasets. These problems can have significant stochastic components, this could be algorithmic (stochastic gradient) or unknown parameters in underlying systems which could be modeled as random variables. The goal of the workshop is to bring together researchers working in optimization, scientific machine learning, and computational science to address pressing challenges at the intersection of engineering, data science, and scientific computing. Topics of interest may include new methodologies for simulation-constrained optimization, optimization under uncertainty, optimization in distributed computing environments, reduced order modeling, efficient training of networks, and uncertainty quantification for machine learning. A wide range of scientific applications will be considered.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *I have not explored using optimization for my work on numerical analysis for fluid flows and multiphysics systems before and because of the workshop, I got some ideas how these techniques could be helpful.*
- *Coming from applications and more applied structural optimization, the workshop put me in contact with applied mathematicians who are working on building blocks that are suitable for my current and future work. This includes efficient PDE solvers for non-linear wave problems, new ways of treating inequality constraints and ML methods with (hopefully!) potential in preconditioning of indefinite systems.*
- *I have not explored using optimization for my work on numerical analysis for fluid flows and multiphysics systems before and because of the workshop, I got some ideas how these techniques could be helpful.*

Some workshop participants' comments on "Briefly describe workshop highlights":

- *The opening session on Stochastic Gradient Methods was the definitive highlight for me, as it was the most directly related to my current work. Beyond my current focus, the presentations on topology optimization were incredibly compelling. Seeing how physical components are optimized for production was fascinating. It demonstrated a clear bridge between high-level theory and real-world production and manufacturing.*
- *Getting exposed to all of the different research directions in this area was great. And the informal discussions in between talks were quite valuable.*
- *Meeting new researchers and attending talks in fields I'm not familiar with were my highlights.*

Topical Workshops

ICERM's Topical Workshops run over 5 weekdays and focus on a timely and exciting theme that aligns with the institute's mission of supporting and broadening the relationship between mathematics and computation. ICERM hosts several Topical Workshops each year. They are typically scheduled in December, January, and May through August (around the dates of the semester programs).

1. Solicitation of Topical Workshop Proposals

A Topical Workshop proposal should be 2-4 pages and contain:

- List of 3-6 organizers, and the main contact for the organizing committee
- Description of the program area/theme, written for a general mathematical audience
- Description of the experimental and computational aspects of the program

2. Topical Workshop Selection

Proposals are submitted to the ICERM Director. The Scientific Advisory Board (SAB) approves the Topical Workshops. The deadline for proposals is October 1, prior to the annual November SAB meeting, and May 1, prior to a mid-May conference call.

Approved program dates are scheduled. The workshop's lead organizer will assist ICERM staff by providing appropriate program images for web and print ads and will be asked to review marketing materials. Details are posted on the ICERM website and various online math organization calendars such as AMS and National Math Institutes.

3. Recommendation of Speakers

The organizers propose a ranked list of 20-25 speakers, which the ICERM Directors approve and make additional suggestions as needed.

4. Invitations to Speakers

Once the list of workshop speakers has been finalized and funding determined, an invitation is sent to each. The invitation describes the program and outlines the support to be provided. ICERM all include language regarding Brown University's Code of Conduct, which addresses sexual harassment, discrimination, and other unprofessional behaviors.

5. Application Process

Once the organizers and Directorate agree there is enough critical mass in terms of confirmed speakers, applications are opened and accepted online for that particular workshop on the ICERM website. All applications are stored and evaluated in the institute's Cube database.

6. Applicant Selection

Program organizers can view the applicants and their supporting documents as well as prioritize them within Cube. A member of the ICERM Directorate reviews the prioritized list, re-ranks as appropriate and makes the final selections, taking into consideration the remaining space in the program, participant support requested, and whether or not the applicant is a young researcher who has an advisor already participating in the program. ICERM staff then updates the applicant about their status and any support for which they are eligible, as appropriate.

Financial Decisions for Topical Workshops

Financial decisions are made by ICERM directors based on input from and discussions with organizers. ICERM covers travel and lodging expenses of the organizers and 20-25 invited speakers/lead participants; some applicants to the workshop may also be supported.

Topical Workshops in 2025-2026

ICERM hosted 14 Topical Workshops from May 1, 2025, to April 30, 2026. These workshops focus on topics of current interest in the mathematical sciences.

The list of participants for each of ICERM's 2025-2026 Topical Workshops can be found in Appendix C.

Topical Workshop 1: Uncertainty Quantification for Mathematical Biology

May 5 - 9, 2025

Organizing Committee:
Daniela Calvetti, Case Western Reserve University
Nicholas Cogan, Florida State University
Linh Huynh, Dartmouth College
Akil Narayan, University of Utah
Jody Reimer, University of Utah

Workshop Description:
Mathematical models play a vital role in understanding complex biological systems. However, these systems are often characterized by indirectly and partially observed, noisy, and high-dimensional dynamics and data. Current models often fail to adequately account for the various sources of uncertainty within the data, leading to inaccurate or incomplete models with limited explanatory power.

The field of uncertainty quantification (UQ) offers approaches to address these challenges. UQ is the mathematical study of how uncertainty influences and propagates through models, allowing researchers to quantify the impacts of uncertainty on model-based predictions, inference, and design. Despite its success in other scientific domains, the application of UQ techniques in mathematical biology remains underdeveloped.

This workshop capitalizes on the significant potential for mutual advancement in UQ and mathematical biology through cross-disciplinary collaboration. Bringing together UQ practitioners and mathematical biologists will allow UQ methodologies to be applied to explore and improve biological models through computational methods. Conversely, the unique challenges of modeling uncertainty in biological systems can inspire the development of novel UQ techniques. By fostering research collaborations at the intersection of computational and mathematical biology, UQ algorithms, and data-driven learning, this workshop aims to galvanize advancements across these fields.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic":

- *I had only a brief idea as to what uncertainty quantification was and in the context of my research. This workshop showed several new facets of UQ that I will explore further, several of which will be useful for later research projects.*
- *Although I was already quite familiar with the main methods and theory for uncertainty quantification, the talks at ICERM have been useful for improving my knowledge of Bayesian techniques, in particular. Furthermore, they have increased my understanding of experimental constraints - and the related challenges - in application areas such as cardiovascular modelling, drug development, and others.*
- *This was a wonderful opportunity to meet new people with interests in a shared research theme. It exceeded expectations with respect to the types of research ideas it would generate and the new collaborations inspired. The ample time for discussion and the mixed format (talks, discussion groups, poster session, etc.) was a nice mix.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *The multiple ways in which participants were encouraged to meet and interact at all levels. I had great conversations with new people at all career stages, from early graduate students to those who are very senior in their fields.*
- *The highlight was the mini-tutorial where one of the techniques in Uncertainty Quantification was explained using a Matlab script that was distributed to all attendees.*
- *Everything, really, but what stood out for me was the quality and relevance of all the talks.*

Topical Workshop 2: Links in Dimensions 3 and 4

May 12 - 16, 2025

Organizing Committee:
Miriam Kuzbary, Amherst College
Gage Martin, Harvard University
Brendan Owens, University of Glasgow
Ryan Stees, University of Virginia

Workshop Description:
A topologist might hope that results in knot theory can always be extended to links. Decades of work in link theory show such extensions are not always straightforward and are, in fact, sometimes impossible. There are also properties and strategies unique to link theory. For all these reasons, link theory is a rich source of relationships to driving questions in the study of topology in dimensions 3 and 4. Among the most compelling are connections to 4-dimensional surgery, exotica in dimension 4, and the study of surfaces in 4-manifolds. Additionally, a vast number of open questions and unexplored topics remain within the confines of the theory in areas such as link concordance, link homotopy, and homology theories, including Heegaard Floer homology and Khovanov homology.

This workshop will bring together low-dimensional topologists of all backgrounds to further the general knowledge of link theory within the low-dimensional topology community, including techniques and tools used to study links and important open questions connected to link theory.

In particular, the workshop will highlight how computation interacts with current research in link theory. The workshop will also provide a space for new collaborations to develop and promote a supportive and inclusive environment within the community of researchers.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *I have not been active in this research area for more than a decade. This workshop allowed me to reconnect and get up to speed on recent developments to an extent that greatly exceeded my expectations.*
- *A leisurely conference schedule, with significant collaboration time, allowed me to meet multiple authors whose work I had read, and gave me ample opportunity to ask important clarifying questions and bounce future research directions off these authors. One researcher proposed a project for them and me to work on, and I had an opportunity for in-person face-to-face collaboration on a project that I already had going. These times are invaluable and lead to rapid progress, especially because when we got stuck we could ask an expert (who was around at the conference) to help.*
- *It was really valuable to become deeply immersed in important mathematics that is relevant to my own work, but with which I was previously unfamiliar.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *Meeting and interacting with significant experts in this field that I am trying to enter.*
- *Having another participant, whom I had not met before, describe to me how he used a previous result of mine in his work.*
- *The extended collaborative time in the large lounge space was incredible. I do not know when, if ever, I have seen so much enthusiasm from so many mathematicians in the same room.*

Topical Workshop 3: Scientific Machine Learning for Gravitational Wave Astronomy

Jun 2 - 6, 2025

Organizing Committee:
Sarah Caudill, University of Massachusetts Dartmouth
Katerina Chatziioannou, Caltech
Maya Fishbach, University of Toronto
Brendan Keith, Brown University
Jess McIver, The University of British Columbia
Michael Puerrer, University of Rhode Island
Joshua Speagle, University of Toronto
Vijay Varma, University of Massachusetts, Dartmouth

Workshop Description:
The aim of this workshop is to bring together participants from computational mathematics and gravitational wave astronomy to tackle computational challenges in leveraging data-driven methods in key areas of gravitational wave data analysis in order to maximize the science output of the ongoing and upcoming observations. The areas of focus will be: (i) noise classification and

detection, (ii) waveform modeling and uncertainty quantification, and (iii) source parameter and astrophysical population Bayesian inference.

The participants will develop and apply new mathematical and computational techniques including: (i) neural network classifiers for distinguishing signals from instrumental noise, (ii) generative machine learning models for simulating realizations of non-Gaussian and non-stationary stochastic processes, (iii) surrogate models including uncertainty quantification, (iv) stochastic sampling, neural posterior estimation leveraging deep neural networks with normalizing flows or diffusion models, and (v) hierarchical Bayesian inference with non-parametric models such as Gaussian processes and simulation-based / approximate Bayesian approaches.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *This week, I had the valuable opportunity to meet many researchers whose names I had only seen in papers before. Listening to their insightful talks and engaging in vivid discussions was truly inspiring and rewarding. What I found most exciting was the chance to exchange ideas with other participants — through our conversations, we came up with a shared idea and even planned a potential collaboration. It was a week full of intellectual stimulation, new perspectives, and meaningful connections.*
- *I knew very little coming in, so this was a great introduction.*
- *This was a great workshop for learning about the state-of-the-art of machine learning for gravitational waves. It brought together specialists in gravitational waves, machine learning, and statistics, and gave me new ideas for future research.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *The highlight was the afternoon discussion sessions. I think having smaller groups break out with specific subtopics was incredibly helpful, as it allowed us to really get into the parts we were interested in.*
- *Very welcoming environment for young scientists. A lot of opportunities to share ideas and see how experienced scientists deal with research questions.*
- *The workshop brought together many outstanding researchers working at the intersection of AI and gravitational waves. It was truly inspiring to exchange ideas and discuss research directions with such a vibrant and knowledgeable community.*

Topical Workshop 4: Algebraic Points on Curves

Jun 23 - 27, 2025

Organizing Committee:
Abbey Bourdon, Wake Forest University
Robert Lemke Oliver, Tufts University
Ari Shnidman, Institute for Advanced Study
Isabel Vogt, Brown University

David Zureick-Brown, Amherst College

Workshop Description:
In recent years, there has been an explosion of activity surrounding algebraic points on curves, from many different perspectives. These include the study of measures of irrationality, isolated and parametrized points, computational methods to determine algebraic points, and the arithmetic statistics of algebraic points. In this workshop, we aim to bring together researchers from these diverse perspectives, with the particular goal of developing bridges between them. The workshop will include overview talks on the various perspectives, research talks, an open problem session, and structured time for collaboration.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *Through the collaborative work undertaken in this workshop, I have gained a great understanding into the theoretical and computational methods for computing gonalities of curves, which were unknown to me beforehand. Through numerous discussions with many participants at this workshop, I have also developed lots of insights into existing problems that I was working on in my research.*
- *I learned about several examples relating to low-degree points on curves, including the failure of Hilbert irreducibility over rational points of a positive rank elliptic curve and a construction where the fibers of a quotient map are not all of the same length. These examples have reshaped the way I think about some constructions. I also learned where the difficulties lie in several open problems that I would naively have expected were already solved.*
- *The workshop gave me new perspectives on questions I've been thinking about.*

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Some workshop participants' comments on "Describe the highlight of this workshop":

- *Speaking with researchers with a more geometric perspective -- I learned so much and have several future directions to explore.*
- *Collaborations in small groups. I enjoyed that there were more short (30 minute) talks rather than longer talks.*
- *The working sessions in the afternoon were a highlight of the workshop. It was very nice to have time to learn about new-to-me open problems and to spend time working with researchers from a variety of backgrounds across algebraic geometry and number theory.*

Topical Workshop 5: LMFDB, Computation, and Number Theory (LuCaNT) 2025
Jul 7 - 11, 2025

Organizing Committee:
John Jones, Arizona State University
Jennifer Paulhus, Mount Holyoke College
Andrew Sutherland, MIT
John Voight, University of Sydney

Workshop Description:
This will be a one-week conference broadly focused on the topics of the L-functions and modular forms database (LMFDB), mathematical databases, computation, and number theory. The conference will include invited talks, presentations by authors of papers submitted to the conference and selected by the scientific committee following peer-review, as well as time for research and collaboration. We plan to publish a proceedings volume that will include all of the accepted papers.

The field of mathematical databases has emerged as an important area of research at the intersection of computer science and mathematics. It seeks to address questions that arise when organizing, storing, and providing access to mathematical knowledge in a structured manner. These databases are intended to be easily searchable and navigable, providing researchers, educators, and students with a convenient way to access mathematical content. There are many challenges in developing and maintaining mathematical databases, ranging from data quality and integration, to standardization, search design, updating and maintenance, and usability. In addition, many algorithmic and theoretical questions emerge naturally when considering systematic computations that must be done on a large scale.

This workshop is partially supported by the Simons Collaboration Arithmetic Geometry, Number Theory, and Computation.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *I've learned how and why people maintain mathematical databases, and how they can be used to obtain new results and motivate further research*
- *I have decided to clean up and publish to arxiv some of my previous research as a result of a discussion here. Otherwise, the conference didn't give me any ideas for my current research but did give me some ideas for future research..*
- *The LMFDB project was completely new to me since I am a newcomer to L-functions and modular forms. However, I have found that I can use the LMFDB website for teaching undergraduate group theory and number theory. Students can explore various examples to better understand abstract concepts, and vice versa. My math department does not have a graduate program in pure mathematics.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *I'm now super motivated to do more calculations to add to these databases. It sounds like there are a lot of fun projects to keep me busy moving forward.*
- *I appreciate that some time was given to open collaboration. This is a powerfully collaborative community.*
- *Two times were very significant to me. First was the time that I actually presented my research. The audience of this conference is comprised of the few individuals in the world who could begin to understand, appreciate, and question my research. Hence, it was an incredible opportunity for me to present the work that I do to audience members who*

have spent a significant part of their lives on such types of mathematics. The second time was when we were given a chance to collaborate and work together on problems with other attendees. The time that I spent working with others and actively working together on problems was both fun and effective!

Topical Workshop 6: Innovative and Efficient Strategies for Stiff Differential Equations
Jul 21 - 25, 2025

Organizing Committee:
Sigal Gottlieb, University of Massachusetts Dartmouth
Zachary J Grant, University of Massachusetts Dartmouth
Jingwei Hu, University of Washington
David Ketcheson, King Abdullah University of Science & Technology

Workshop Description:
A universal source of difficulty in the numerical solution of differential equations is stiffness, which may stem from multi-scale dynamics and means that straightforward explicit discretizations are very inefficient. Consequently, choosing how to deal with stiffness (usually through the selection of the time discretization method) is often the most impactful decision made while solving these problems; it can be the difference between complete intractability and rapid solution.

The most prominent and well-known effect of stiffness is its impact on numerical stability. Lesser-known but often equally important is the effect of order reduction, in which the convergence of the numerical solution is dramatically slowed compared to what classical numerical analysis would predict. Both of these issues can be dealt with through the use of implicit time discretizations. However, for large-scale applications (such as those coming from multi-dimensional PDE applications), such discretizations can entail an even higher cost as they require the solution of large systems of algebraic equations. Ongoing development in the field of time discretization now focuses on methods that are increasingly specialized and, in some cases, increasingly complex. The aim of this workshop is to advance the field of time evolution for PDEs by bringing together a broad community that will address this important issue in a variety of ways.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *The long format of the talks helped give the speakers time to provide needed background and entertain questions, so there was time to actually learn new theory and methods.*
- *This workshop provided an excellent overview of the field. The talks and panel discussions gave a thorough overview of completed and ongoing work, and highlighted many potential directions for future study.*

- *Many new theoretical results and numerical experiments were covered by experts on stiffness. I was not aware of much of this work.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *The highlight of the workshop for me was definitely the overall atmosphere, it was very positive and intellectually stimulating. I found the talks extremely interesting, both for the quality of the speakers and the relevance of the topics discussed. It really gave me a lot to think about for my future work.*
- *The organizers' excellent job in selecting speakers with diverse research backgrounds (numerical methods for PDEs, time stepping methods, computational issues, software development, etc.), with a schedule that allow participants to exchange ideas, and held in a venue with excellent resources and staff.*
- *Many new theoretical results and numerical experiments. It is not possible to single out only one highlight.*

Topical Workshop 7: Fostering Cross-Disciplinary Collaboration in Biology, Medicine, and Computational Science

Jul 28 - Aug 1, 2025

Organizing Committee:
Belinda Akpa, University of Tennessee
Jun Deng, Yale University
Wenrui Hao, Pennsylvania State University
Jungwoo Lee, University of Massachusetts-Amherst
Jeffrey Petrella, Duke University
Leili Shahriyari, University of Massachusetts Amherst
Ioannis Zervantonakis, University of Pittsburgh - McGowan Institute for Regenerative Medicine

Workshop Description:
Since many computational tools and mathematical models developed for one disease can be tailored and applied to others, particularly in the field of precision medicine, this workshop provides a unique opportunity to foster collaboration between researchers focused on two distinct sets of diseases: neurological disorders and cancer. Both diseases involve exploring shared mechanisms, such as genetic mutations, protein misfolding, and altered cellular metabolism. Both conditions also involve chronic inflammation, immune response alterations, and dysregulated cell cycle and apoptosis pathways. These overlaps suggest potential for shared therapeutic strategies and drug repurposing, offering new avenues for treatment in both fields. By encouraging cross-disciplinary dialogue and the exchange of methodologies, we aim to facilitate the adoption of innovative approaches across disease areas, enhancing both fields.

One of our key goals is to encourage mathematicians and computational scientists to engage in biological and medical research. By highlighting successful applications of mathematical tools in

biology, such as machine learning for genomic analysis or differential equation models for disease progression, we aim to illustrate the exciting potential for cross-disciplinary innovation. Furthermore, the workshop will include sessions that explore emerging computational methods and how they can be applied to pressing challenges in both cancer and neurological disorders.

This event will bring together experts from diverse disciplines to generate novel solutions for complex challenges in neurological diseases and cancer research. Participants will have the opportunity to establish new collaborations, share insights, and explore potential research initiatives that capitalize on the intersection of computational modeling, biology, and medicine. By leveraging this cross-talk, we hope to advance both the understanding and treatment of these diseases through shared expertise and cutting-edge methodologies.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *The ICERM workshop greatly enhanced my understanding of experimental and computational methodologies relevant to Alzheimer's Disease (AD) research, particularly in the context of the Physics-Informed Neural Networks (PINN) framework. I gained insights into how PINNs can be employed to integrate prior physical knowledge of neuronal dynamics and biochemical processes into machine learning models, allowing for more accurate and interpretable simulations of AD progression.*
- *Attending the ICERM conference provided me with valuable insights into the latest international research frontiers. It also offered opportunities to establish new academic connections, and I initiated discussions on potential collaborations with several speakers.*
- *Attending the ICERM workshop introduced me to new computational concepts. One of such is digital twins. This is something I plan to look more into.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *This workshop was a valuable and inspiring experience that deepened my understanding of both computational and theoretical aspects of my field. Engaging discussions allowed me to share my own ideas, gain new perspectives, and identify computational strategies to enhance my current research in Electrical Impedance Tomography (EIT). I also began exploring a new direction involving the integration of medical data with machine learning and AI techniques. The poster session was a standout moment, offering fresh insights and sparking conversations that opened the door to potential future collaborations.*
- *It was a wonderful workshop where I met researchers from biological domains and initiated follow up meetings with them. We will write a joint NIH proposal and carry out collaborative research.*
- *I found a valuable collaborator and many impressive and helpful friends. That is basically what I came here for. So many thanks to the organizers and the institute for putting this together.*

Topical Workshop 8: Random Polynomials and Their Applications

Aug 4 - 8, 2025

Organizing Committee:
Hoi Nguyen, Ohio State University
Oanh Nguyen, Brown University
Sean O'Rourke, University of Colorado Boulder
Igor Pritsker, Oklahoma State University

Workshop Description:
This workshop focuses on random polynomials - with coefficients that are random variables - in mathematics as well as their applications in other fields. Studying the zeros of a polynomial is one of the oldest and most fundamental problems in mathematics. Classical results include bounds on the number of real roots and connections between the roots and critical points, while extremal properties and approximation theorems have established the importance of polynomials as objects in analysis.

Random polynomials arise in many applications, ranging across many fields of physics, engineering, economics, and mathematics. For example, in recent years, random polynomials have been used to study problems in evolutionary game theory, random matrix theory, free probability theory, numerical analysis, symplectic geometry, quantum chaotic dynamics, random differential equations, and approximate solutions of operator equations. This meeting will be a forum to explore problems involving random polynomials, focusing on the various aforementioned applications and involving researchers who study their theoretical, applicable, computational, and numerical aspects.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *ICERM has significantly added to my knowledge of experimental/computational methods and theoretical developments through the facilitation of the gathering of the top experts in the field of random polynomial theory. ICERM provides the perfect environment for both the dissemination of new ideas and the collaboration of mathematics between institutions.*
- *Many of the speakers were top experts in the field who gave good explanations that helped me to better understand the nuances of results and methodologies at the edge of the field of random polynomials. Space for lunch and between talks (with access to work areas/whiteboards) facilitated some good discussions and connected me with new colleagues (some in the US, and some abroad) with whom I anticipate productive collaborations in the near future. The in-person nature of the conference was huge for me because it allowed me to listen to conversations and ask questions directly to experts.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *I learnt many of the open problems that people in the community are interested in, and formed research connections that can produce future collaborative papers.*

- *The highlight of this workshop was the opportunity to meet and speak with numerous experts of the field, the openness of the participants to share their ideas to further the field, and the professionalism exhibited by the ICERM environment.*
- *I really enjoyed the time structure of the workshop. It felt like enough talks to get a lot of perspectives throughout the week, but also enough breaks to allow for plenty of discussions.*

Topical Workshop 9: Illustrating Mathematics: Reunion/Expansion

Aug 11 - 15, 2025

Organizing Committee:
David Bachman, Pitzer College
Audrey Nasar, Fashion institute of technology
Nancy Scherich, Elon University
Saul Schleimer, University of Warwick
Martin Skrodzki, TU Delft
Laura Taalman, James Madison University

Workshop Description:
Illustration reveals the hidden structures of mathematics, broadening access to its inherent beauty and pushing the boundaries of research. Here two disciplines are interwoven: on the one hand, the art and craft of presenting ideas and on the other hand, the creativity and scholarship of creating mathematics. This program facilitates research and collaboration on these topics, both between and within these groups, and to promote professional support and recognition both for illustration and for building the infrastructure needed for its creation.

We invite both returning and new members to the Illustrating Mathematics community to this workshop, which will bring together mathematicians, and practitioners from the arts. We seek to expand our community to include a more diverse group of faculty, including those from non-R1 institutions and who identify as members of underrepresented and minoritized groups.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *The wide expertise of the participants made it possible to learn a lot of math by asking domain experts. I learned specific things I can implement in my own work about energy functionals on spaces of embeddings (and computational methods), methods of avoiding reflecting boundaries in numerical PDE GPU simulations, and tools to efficiently compute Galois groups when working with millions of polynomials (in Sage and in custom code). I also learned much general mathematics not immediately tied to computation, including high level overviews of various resolution of singularities theorems, foundational definitions in perfectoid geometry, and the algebraic geometry of planar linkages.*
- *It was beautiful to see how the community has developed since the 2019 semester. At that time a group of people came together working on similar ideas. At the reunion/expansion*

we saw how work was now being done not just as individuals, but building on each other's work. Both from talks and conversations I came away with several projects that will be pursued over the next year or two.

- *I was unaware of computational developments that are allowing for new *practical* applications of art in solving social and scientific problems! In a different vein, I've learned about some open problems I'm hoping to work with others at the conference to solve.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *The "show and ask" sessions were made to make the creative juices flow. I wonder if it's possible to do something similar in pure and computational mathematical fields. I also liked the working lunch when there was a good discussion about topics of interest to attendees.*
- *There were many outstanding talks, far more than is typical. The "show and ask" was also very good. But, the informal conversations and impromptu activities were the highlight.*
- *Incredible talks, inspiring ideas, driving energy!*

Topical Workshop 10: Graduate Workshop on Linear Algebra over Finite Fields & Applications

Aug 18 - 29, 2025

Organizing Committee:
Jason LeGrow, Virginia Tech
Hiram López, Virginia Tech
Gretchen Matthews, Virginia Tech
Luciane Quoos, Universidade Federal do Rio de Janeiro
Angela Robinson, NIST
Joachim Rosenthal, University of Zurich

Workshop Description:
Linear algebra over finite fields is a building block for several applications including data storage, error detection and correction, and public-key cryptography. These applications enable the security and possibility of our daily digital lives. This workshop aims to expose and engage junior researchers in the foundations and applications of linear algebra over finite fields.

Like linear algebra over infinite fields, linear algebra over finite fields considers vector spaces, matrices, and linear transformations, but there are some crucial differences that play a key role in applications. For instance, the intersection of a vector space and its dual may be nontrivial, and its dimension plays a role in entanglement assisted quantum error correcting codes, secret sharing, and protecting against fault injection and side channel attacks. Working over finite fields also facilitates error correction (classical and quantum) and local recovery of data, through linear systems of equations with only finitely many possible solutions. Linear algebra over finite fields plays a key role in code-based cryptography, the basis for families being considered in the final round of the NIST Post-Quantum Cryptography Standardization process. Quantum algorithms

lead to vulnerabilities in current public-key cryptosystems which are prompting new studies of how matrices and linear algebra can support new cryptography.

This workshop will feature lectures on various applications of linear algebra over finite fields. Participants will learn about the interplay between coding theory and cryptography along with mathematics related to a range of applications.

Participants will be assigned a group led by one of the course instructors. Open problems suitable for exploration by non-experts will be shared, and students will be guided in the research by these instructors.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *I really enjoyed the diversity of lectures and the technical depth of the lectures. I also really got a lot out of the working sessions. The computational sessions (SageMath, Macaulay2, Magma) were also really great. I thought the organizers did a really great job of putting together this program.*
- *I gained more knowledge among topics which were adjacent to my research, such as coding theory, cryptography and computational mathematics.*
- *The breadth of the workshop made many activities accessible to beginners in the topic like me and helped me at least follow the broad strokes of more advanced talks, like the ones on coexeter codes. The workshops on Sage were especially beginner friendly while also seeming to give some of the more advanced researchers new ideas for features/packages to suggest or implement.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *I liked working on problems within the group work time. It gave me an opportunity to connect with others and really engage with the material being presented.*
- *The workshop was very impactful for my research, as I was exposed to different areas such as cryptology, coding theory, and their applications. The use of various software tools also helped us connect pieces of theory and gain a deeper understanding of the concepts. Moreover, the community was welcoming, easygoing, and respectful. I truly enjoyed being part of this workshop.*
- *This was my first time interacting with researchers in this area and everybody was very welcoming and encouraging. The speakers and organizers created an interactive atmosphere and it was nice to see them asking each other questions and learning with us. ICERM employees and the building staff were very helpful with settling in and helped the whole thing run very smoothly.*

Topical Workshop 11: Webs in Algebra, Geometry, Topology and Combinatorics

Dec 8 - 12, 2025

Organizing Committee:

Ian Le, Australian National University
Pavlo Pylyavskyy, University of Minnesota
Jessica Striker, North Dakota State University
Joshua Swanson, University of Southern California

Workshop Description:
Webs are diagrammatic tools for representing complex calculations graphically. These diagrams first arose from the representation theory of classical groups, and they have since become important in disparate areas of mathematics. In representation theory, they encode morphisms of quantum groups. In topology, webs give rise to powerful link invariants. In algebra and geometry, Kuperberg's sl3 web bases have important relationships with the theory of cluster algebras and affine buildings. In combinatorics, they explain certain dynamics on Young tableaux. Recent work by Gaetz--Pechenik--Pfannerer--Striker--Swanson introduced an sl4 web basis that has exploited and extended exciting connections between webs, plabic graphs, and crystals. There are further connections to total positivity, duality conjectures for cluster algebras and mirror symmetry.

Recently, there have been major developments in the theory of webs and web bases from multiple perspectives, such as recent work of Bodish--Elias--Rose--Tatham in type C motivated by applications to link homology. We believe that webs may serve as a nexus for disparate communities of mathematicians to meet. This includes not only fostering connections between researchers in algebraic combinatorics, Schubert calculus, and representation theory, but also building bridges with researchers in algebraic geometry via mirror symmetry and cluster geometry as well as researchers in topology and knot theory via the diagrammatic method. The goal of this workshop is thus to bring together experts from these communities and cross-fertilize these diverse subjects by spreading knowledge of recent developments and perspectives on our shared interest in webs.

This workshop will also provide an opportunity for distinct research groups to share current code functionality as well as future needs and desires, with an aim towards building collaborative and open-source computing capabilities.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *Experimental: I was able to download and learn to use new software relevant to my research from the code demo. Theoretical: I learned more about how knot theorists and topologists use the webs that I have worked on and am interested in from the perspective of combinatorics.*
- *I learned what is going on in a lot of areas that are adjacent to my current research. There is so much more opportunity to expand my research horizons now! Plus I have now met all the natural people to teach me more.*
- *A certain object I learned about in a talk here seems like it may be useful for a concrete problem I have been interested in.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *Usually at conferences I don't meet a lot of new people because I already know everyone. The conference did a fabulous job bringing different communities together and it was very exciting to make so many new connections.*
- *The conference was largely about new developments following some of my older work in a topic that still interests me. I have never gotten so many citations and so much deferential interaction at a conference before in my life. It was wonderful.*
- *My first workshop! It's great to see a lot of faculty, and some of my friends made in the summer school of algebraic combinatorics in SLMath this year.*

Topical Workshop 12: Extremal Black Holes and the Third Law of Black Hole Thermodynamics

Jan 5 - 9, 2026

Organizing Committee:
Stefanos Aretakis, University of Toronto
Radouane Gannouji, Pontifical Catholic University of Valparaíso
Elena Giorgi, Columbia University
Gaurav Khanna, University of Rhode Island
Steven Liebling, Long Island University
Thomas Maedler, Universidad Diego Portales

Workshop Description:
The aim of the workshop is to explore the implications and next steps of recent advances in understanding the dynamics and thermodynamics of near extremal black holes. By bringing together researchers in this area spanning the wide range of approaches, from rigorous mathematics, perturbation theory, and numerical methods, the workshop will focus on future directions.

Extremal black holes are mathematical solutions of Einstein's equations describing stationary black holes with either maximal spin or maximal charge, and these black holes have special properties such as zero temperature. Recent studies have found certain surprising aspects of their dynamics including scalar hair and an avenue for their formation from subextremal configurations that violate the third law of black hole thermodynamics. These results raise a number of questions including the stability and critical behavior of such solutions that may be addressed via other research avenues.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *It presented to me the current state of research and helped me put my own research in a larger perspective.*
- *This meeting was wonderful for bringing numerical relativists (like me) together with mathematical relativists, so the main benefit for me was new ideas for scoping numerically what might be true (which could later be proved) and for finding numerical*

instances of solutions that have been proven to exist (but using a proof that is not constructive).
- *I understand much better what the mathematicians have found, and I see a few avenues for studying the behavior of extremal black holes numerically.*

Some workshop participants' comments on "Describe the highlight of this workshop":
- *It was inspiring to hear some of the talks and to spend time in closer contact with other people in the field.*
- *The talks on the history of the third law of BH thermodynamics, and some of the most recent theoretical and numerical developments on extremal critical collapse. Interacting with the speakers after talks Interesting talks and great place.*
- *The workshop put together theorists and experimentalists that are after the same goal, which I think resulted in a very fruitful direction. The long time allowed for discussions between talks and during lunch breaks, with white boards available, was also very efficient.*

Topical Workshop 13: Nonparametric Bayesian Inference - Computational Issues
Jan 12 - 16, 2026

Organizing Committee:
Tamara Broderick, Massachusetts Institute of Technology
Peter Mueller, University of Texas at Austin
Igor Pruenster, Bocconi University
Sinead Williamson, University of Texas at Austin
Yanxun Xu, Johns Hopkins University

Workshop Description:
Statistical models are almost never right. All models involve certain parametric and structural assumptions. Bayesian nonparametric inference (BNP) is an increasingly widely used approach to mitigate the dependence on such assumptions. After a rapid expansion of BNP research over the past 30 years, BNP is now a mature research area in statistics and machine learning. The current main challenges are related to computational hurdles and bottlenecks and the closely related need to tackle more complex and highly structured problems.

This program brings together researchers working in BNP, including computation, foundations, methodology and application of BNP methods, with the goal of identifying newly emerging computational strategies and inference approaches. The program and invited talks are planned to balance theoretical expertise, interest and prowess in computational methods, and exposure to selected substantial application areas. The intended nature of the program as identifying synergies of different approaches and potentially new research directions naturally leads to favoring breadth over depth, with more emphasis on covering diverse areas rather than on in-depth discussions of a single specific theme.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *The talks at the workshop were of a very high scientific level, and all the participants were experts in their respective fields. I had the opportunity to become aware of the most important methodological and computational developments in Bayesian nonparametrics.*
- *ICERM really helped me deepen my understanding of both the computational side and the related theory in Bayesian nonparametrics (especially around practical computational issues). The program was super well organized, with a great balance between talks and plenty of time for discussion, which made it easy to have follow-up conversations and dig into details. The facility is fantastic, and the ICERM staff were amazing—always helpful and on top of everything—so the whole experience was smooth and very productive.*
- *This has been a great workshop for my research program. I received excellent feedback on my work in progress and I have several new ideas for future work. I met several new individuals and potential collaborators. The staff (e.g., Steven and Erik) were very helpful and professional. ICERM is doing the community a great service.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *A key highlight for me was seeing a unified picture of how the community is pushing Bayesian nonparametrics beyond standard settings. I also especially valued the concrete computational takeaways; several of these tools, with suitable tailoring, can be brought directly into my own work.*
- *The workshop was intentionally small, which fostered strong interaction among participants and provided the opportunity to expand my research network. The talks were consistently of high scientific quality throughout the event, and the focused nature of the workshop encouraged in-depth discussion on specific topics. I also appreciated the timing: 30 minutes for the talk followed by 15 minutes for discussion, which allowed ample opportunity to ask questions.*
- *I think the workshop combined young and experienced researchers. I saw many of them interact over these days in a totally relaxed mood. I'm sure great new ideas and projects were concocted over these days,*

Topical Workshop 14: Nonlinear Waves: From Theoretical and Computational Advances to Experimental Observations

Apr 27 - May 1, 2026

Organizing Committee:
Justin Holmer, Brown University
Panayotis Kevrekidis, Seoul National University and University of Massachusetts Amherst
Vassilis Koukouloyannis, University of the Aegean
Zhiyuan Zhang, Northeastern University

Workshop Description:

The palette of coherent structures in nonlinear media is very rich extending from the classic 1D ones like pulses, fronts, kinks, breathers, (dark/bright) solitons, to higher-dimensional ones like vortices, vortex rings and knots, spiral waves and more exotic ones like skyrmions and monopoles. These structures are highly interesting in their own right, but also play a crucial role as building blocks towards understanding more complicated and realistic features of the full underlying systems.

The methodologies of studying this field vary from techniques taken from mathematical analysis and differential equations to numerical analytical and machine learning techniques, while experiments always play a crucial role in touching base with respect to physical reality. This conference aims to bring together people both from the analytical and the computational worlds, along with experimental practitioners, to discuss the state-of-the-art and emergent challenges of the field of nonlinear waves and coherent structures. It will accordingly seek to establish a mutually beneficial dialogue which could provide valuable insights in different directions, setting the stage towards future investigations.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *The ICERM workshop on nonlinear waves strengthened my understanding of both theoretical and computational developments in the field. I gained clearer insight into how nonlinear dynamics, dispersion, and stability are analyzed, while also being exposed to practical computational approaches such as spectral and pseudospectral methods for simulating wave behavior. What stood out most was how the workshop connected theory with implementation, highlighting the role of efficient numerical techniques in studying complex wave phenomena. Overall, it provided useful perspectives and tools that I can directly incorporate into my research.*
- *There were several excellent talks on computer assisted proofs that apply to similar questions in my work. Also, I learnt about some novel theoretical methods that are quite relevant to my research. I plan to revisit several of the presentations in the next few months. This was one of the best meetings (in terms of novel directions and novel methodology) that I have attended in the last 6-7 years.*
- *I saw some new results which I believe may be applicable to a problem my group has been working on for close to two years.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *I found the poster session to be very compelling and I appreciated that the talks were well timed with ample question periods.*
- *The highlight of the workshop for me was the strong connection between theory and computation across the different sessions. I particularly valued how complex nonlinear wave phenomena were not only analyzed rigorously but also demonstrated through effective numerical methods and simulations.*
- *Consistent high quality of all invited presentations. Meeting young scholars.*

Collaborate@ICERM (C@I)

ICERM hosted 17 Collaborate@ICERM programs from May 2025 through April 2026.

Collaborate@ICERM offers teams of three to six researchers the opportunity to spend five days at the institute during the summer (May-August) or during the month of January. The team research project should have a computational or experimental component. ICERM provides access to a variety of software packages as well as to high-performance computing through Brown's Center for Computation and Visualization.

Proposals involving research projects that continue a collaboration fostered at one of the past ICERM semester programs are encouraged. Collaborate@ICERM provides limited funding for travel to the institute and local accommodations for six nights. The majority of participants must be from U.S. institutions. The entire team should be present at ICERM for the week.

Collaborate@ICERM Process

1. Solicitation of Proposals

ICERM solicits proposals from faculty through announcements about the opportunity during welcoming remarks at other ICERM programs and calls for proposals in quarterly newsletters.

Though it is not required, Collaborate@ICERM proposers are welcome to contact the ICERM director prior to submitting a proposal for preliminary feedback.

The Collaborate@ICERM proposal should include a research title and the list of team members on the first page, as well as:

- Broad research objectives and specific goals for the week at ICERM, written for a general mathematical audience
- Members of the team (three to six)
- The case for convening at ICERM
- A list of possible dates (five weekdays outside the scheduled fall and spring semester programs)
- Two-page CVs for each team member

The majority of group participants must be from U.S. institutions. C@I groups can include self-funded participants. The entire team should be present at ICERM for the week. An individual invited to more than one accepted C@I proposal within a given review cycle will only receive funding for one of the visits. Individuals should not participate in a C@I program more than twice within three years.

2. Deadline and Review Process

Completed proposals should be submitted to the ICERM director. Annual target deadlines are October 1 and May 1. ICERM directors and the Scientific Advisory Board (SAB) review all proposals. Proposers receive feedback within a month of the SAB meeting.

3. Evaluation

ICERM revised its evaluation process, which applies to all groups meeting since the pandemic. Now ICERM surveys group members one year after their meeting, asking about publications, research products, grant proposals, and other outcomes resonating with ICERM's computational missions.

Collaborate@ICERM Participants and Projects

C@I 1: Interpretable Algorithms for High-Dimensional Data Sets: Analysis, Computation, Machine Learning, Optimization, and Statistics (May 12 - 16, 2025)

- Jingfang Huang, University of North Carolina at Chapel Hill
- Shahar Kovalsky, Duke University
- Yao Li, UNC Chapel Hill
- Jeremy Marzuola, University of North Carolina
- Yichao Wu, The University of Illinois at Chicago
- Kai Zhang, The University of North Carolina at Chapel Hill
- Ping-Shou Zhong, University of Illinois Chicago
- Wenxin Zhou, University of Illinois Chicago

C@I 2: Chow Polynomials of Partially Ordered Sets (Jun 2 - 6, 2025)

- Yairon Cid-Ruiz, North Carolina State University
- Luis Ferroni, Institute for Advanced Study
- Jacob Matherne, North Carolina State University

C@I 3: Machine-learning Interatomic Potentials for Moire Materials (Jun 9 - 13, 2025)

- Drake Clark, University of Minnesota
- Vikram Gavini, University of Michigan
- Mitchell Luskin, University of Minnesota
- Daniel Massatt, Louisian State University
- Christoph Ortner, University of British Columbia
- Ziyan Zhu, Stanford University

C@I 4: Stable Tamari Posets (Jun 16 - 20, 2025)

- Ying A Pun, CUNY Baruch College
- Herman Chau, University of Washington
- Spencer Daugherty, University of Colorado Boulder
- Sean Grate, Auburn University
- Juan Carlos Martinez Mori, Georgia Institute of Technology

C@I 5: A Construction of Quantum Error-Correcting Codes from Classical Quasi-Cyclic Locally Recoverable Codes (Jun 16 - 20, 2025)

- Angelynn Alvarez, Embry-Riddle Aeronautical University, Prescott
- Gustavo Bastos, Federal University of São João del-Rei (UFSJ)
- Cameron Williams, Embry-Riddle Aeronautical University

C@I 6: Computational Modeling of Biofilm Breakup (Jun 23 - 27, 2025)

- Jasmine Kreig, Los Alamos National Laboratory
- Rayanne Luke, George Mason University
- Sarah Olson, Worcester Polytechnic Institute
- Zhuoran Wang, University of Kansas
- Yuehui Xu, Indiana University, Indianapolis

C@I 7: Modeling the Impact of Human Movement on Malaria Immune Dynamics (Jun 23 - 27, 2025)

- Lauren Childs, Virginia Tech
- Olivia Feldman, University of Tennessee Knoxville
- Denis Patterson, Durham University
- Joan Ponce, Arizona State University
- Zhuolin Qu, University of Texas at San Antonio
- Lihong Zhao, Kennesaw State University

C@I 8: Arithmetic Data for Delsarte K3 Surfaces (Jul 7 - 11, 2025)

- Rachel Davis, University of Wisconsin-Madison
- Jessamyn Dukes, University of Denver
- Thais Gomes Ribeiro, University of Birmingham
- Eli Orvis, University of Colorado Boulder
- Adriana Salerno, National Science Foundation
- Leah Sturman, Southern Connecticut State University.
- Ursula Whitcher, Mathematical Reviews (American Mathematical Society)

C@I 9: Finding Geometric and Topological Cores of Higher Graphs (Jul 28 - Aug 1, 2025)

- Ines Garcia-Redondo, Imperial College London
- Claudia Landi, University of Modena and Reggio Emilia
- Sarah Percival, University of New Mexico
- Bei Phillips, University of Utah
- Anda Skeja, Uppsala University
- Ling Zhou, Duke University

C@I 10: Noise is Not Always Bad: A Case Study with the Randomized Kaczmarz Algorithm (Jul 28 - Aug 1, 2025)

- El houcine Bergou, Mohamed VI Polytechnic University (UM6P)
- Xuemei Chen, University of North Carolina Wilmington
- Aritra Dutta, University of Central Florida (UCF)
- Xin Li, University of Central Florida
- Anna Ma, University of California Irvine

C@I 11: Enumeration In Tubing Lattices (Aug 4 - 8, 2025)

- Manuel Concha, Universidad de Talca
- Susanna Fishel, Arizona State University

- Hsin-Chieh Liao, Washington University in St Louis
- Andrew Reimer-Berg, Colorado State University

C@I 12: VECINA (Aug 11 - 15, 2025)
- Carrie Diaz Eaton, Bates College
- Jing Fang, Yale University
- Joseph Hibdon, Northeastern Illinois University
- Victor Piercey, Ferris State University
- Arash Rafiee, University of Rhode Island
- Kiara Sanchez, Boston College
- Bianca Thompson, Westminster University

C@I 13: Dynamics of Gentrification (Aug 11 - 15, 2025)
- Mayleen Cortez-Rodriguez, Cornell University
- Tayler Fernandes Nunez, Cornell University
- Ekaterina Landgren, University of Colorado, Boulder

C@I 14: Fingerprint Matching via topological Data Analysis (Jan 5 - 9, 2026)
- Niny Arcila-Maya, San Francisco State University
- Elizabeth Munch, Michigan State University
- Zofia Stanley, Institute of the Quantitative Stud of inclusion, Diversity, and Equity
- Chad Topaz, Institute for the Quantitative Study of Inclusion, Diversity, and Equity
- Lori Ziegelmeier, Macalester College

C@I 15: Identifiability Of Species Relationships From Quintet Concordance Factors (Jan 5 - 9, 2026)
- Joseph Cummings, University of Notre Dame
- Maize Curiel, ICERM
- Bryan Currie, New Jersey Institute of Technology
- Bryson Kagy, North Carolina State University
- Udani Ranasinghe, University of Hawaii at Manoa
- John Rhodes, University of Alaska Fairbanks

C@I 16: Computing The Expected Covering Radius Of Random Doubled Slit Tori (Jan 12 - 16, 2026)
- Nathan Fisher, Swarthmore College
- Anthony Sanchez, University of Houston
- Sunrose Shrestha, Carleton College

C@I 17: Toward a Juggling Analog for Kostant's Partition Function on the Exceptional Lie Algebras (Jan 12 - 16, 2026)
- Kimberly Hadaway, Iowa State University
- Pamela E. Harris, University of Wisconsin Milwaukee
- Kimberly Harry, University of Wisconsin Milwaukee
- Lucy Martinez, Rutgers University

- Miriam Norris, Queen Mary University of London

Hot Topics Workshops

ICERM hosted five Hot Topics workshops from May 2025 through April 2026. These events are designed to allow ICERM to move quickly in order to start the public exploration of breakthroughs and emerging mathematical areas. They run two to three days and are organized on a few months' notice. They can originate through suggestions from ICERM boards or the community.

The institute welcomes suggestions for Hot Topics workshops and encourages researchers to contact the ICERM director with ideas. The director and a SAB Hot Topics subcommittee considers proposals for such workshops, which should be two pages and include:

- List of organizers, including the main contact for the organizing committee
- Description of the program area/theme for a general mathematical audience
- Explanation why it is a "Hot Topic" that is important and timely
- List of eight to 10 high-level speakers/participants, their research areas, and how they connect to the goals of the workshop
- Preferred dates for the workshop within 6 months of submission.

Hot Topics proposals are accepted February 1, May 1, August 1, and November 1. They are considered by the ICERM director\, and a sub-committee of ICERM's Scientific Advisory Board that decides which proposals will be developed into workshops. ICERM responds to all Hot Topics suggestions within three weeks.

Hot Topics Workshop 1: Applied Math in Statistics and Data Science Education

May 19 - 21, 2025

Organizing Committee:
Alyssa Bilinski, Brown University
Anarina Murillo, Brown University
Alice Paul, Brown University

Workshop Description:
As the field of data science has expanded, there has been a notable increase in collaboration between computer science, statistics, and applied mathematics. This interdisciplinary approach has influenced the structure of traditional statistics education. Specifically, there is a growing emphasis on incorporating computer science skills, such as programming, machine learning, and computational tools for managing big data, into statistics curricula. However, the role of applied mathematics in statistics and data science education often remains under-discussed. This workshop aims to highlight the importance of mathematical modeling, optimization, simulation, and prescriptive analytics in complementing a statistical or data science education.

This workshop is designed for faculty, postdocs, and PhD students who are interested in teaching statistics and data science through an interdisciplinary approach that leverages the strengths of both applied mathematics and statistics. Participants will exchange pedagogical ideas, curricula,

and research applications, fostering collaboration between those teaching data science. The workshop is especially relevant for statistics faculty looking to expand their data science toolbox and applied mathematicians aiming to equip their students with essential data science skills. The workshop is also open to individuals in engineering, epidemiology, computer science and other STEM or public health fields.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *This workshop was nice because it allowed me to meet people who are teaching the same classes as me at different universities. It was a great community builder and gave me a lot of great ideas of what I can implement in the classroom next year..*
- *I gained exposure to a broader array of applications of computation than I was previously aware of. Additionally, I've learned of additional opportunities to exposure early-career students to computational tools and techniques. I will be investigating these further and hope to implement some in my courses.*
- *Presentations on optimization with SIR epidemiology was helpful. Presentation and dialog about estimating model parameter uncertainty may be useful.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *The highlight of this workshop was meeting other professionals who are passionate about teaching and education as it relates to applied mathematics, statistics, and data science. The previous questions in this survey about research collaborations do not capture the important networking, connections, and exchange of ideas that happened this week in terms of teaching and pedagogy. I am leaving with MANY concrete ideas that I will be able to take to my classes and department.*
- *I got a chance to learn about how others are thinking about data science education, construed more broadly than just my one home institution and context. Since I work at a business school, it was great to hear about folks who are doing data science for engineering, medicine, health care, public policy, etc.*
- *I liked the balance of different workshop components - the mix of short talks from invited speakers, lightning talks, panel, and group break out discussions.*

Hot Topics Workshop 2: Synthesizing Research On Ocean Surface Waves In The New Arctic

Jun 30 - Jul 2, 2025

Organizing Committee:
Baylor Fox-Kemper, Brown University
Christopher Horvat, Brown University
Elizabeth Hunke, Los Alamos National Laboratory
Madison Smith, Woods Hole Oceanographic Institution
Erin Emily Thomas, Los Alamos National Laboratory

Workshop Description:

As Arctic sea ice thins and retreats, the region's marginal ice zone (MIZ)—where ocean surface waves, sea ice, and ocean turbulence interact —will continue to expand in area and importance. Ocean surface waves hold critical importance for comprehending the consequences of climate change, especially in polar regions, where their interactions with the sea ice cover can have profound implications. Shipping routes that ply the MIZ and near-MIZ areas have now opened, increasing geopolitical friction and the potential for a novel economic (truly) cold war. The current tools employed for modeling ocean wave-ice interactions are not yet suited for weather or climate studies, which will be essential for projecting and understanding changes to the Arctic economic status quo.

This workshop addresses the urgent need for improved modeling tools to capture the complex interplay of waves and ice for both forecasting and climate studies. Bringing together leading theoreticians, observationalists, and model developers, we aim to forge a community roadmap for applying and integrating ongoing research efforts into a shared model for conducting wave-enabled climate studies in the New Arctic. An expected outcome is the initiation of a dedicated journal special issue and workshop proceedings, providing the scientific community with a comprehensive overview of current capabilities and a clear vision for future research priorities.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *ICERM provided this great opportunity for me to have in-depth discussions with my colleagues who are experts in the field of sea-ice wave interaction during the workshop. The staff were very nice and helpful. The facilities at ICERM (including the well-equipped lecture room, whole wall white board, and lobby with nice chair and coffee etc.) also created a welcoming environment for discussions in research.*
- *Provided great opportunities to build collaborations and meet new people who are active in the field.*

Some workshop participants' comments on "Describe the highlight of this workshop":

- *This workshop really accomplished our goals of bringing together the experts in the fields of ocean waves and sea ice. The combination of modeling at a variety of scales (small scale to global) and observation presentations really helped everyone identify the areas where we are lacking understanding and need more research in the future. I truly have never been to a more collaborative and useful workshop.*
- *The schedule and setup of this workshop encouraged a lot on both formal and informal discussions among the attendees, which helped me to establish academic and personal connections with my colleagues.*
- *The final day's discussion/workshopping session was extremely useful for synthesizing the workshop's outcomes and prioritizing future research directions.*

Hot Topics Workshop 3: From Modeling to Learning with HPC

Sep 13 - 14, 2025

Organizing Committee:
Nancy Amato, University of Illinois Urbana-Champaign
Torsten Hoefler, ETH Zürich
David Keyes, King Abdullah University of Science and Technology
Satoshi Matsuoka, RIKEN Center for Computational Science
Lois McInnes, Argonne National Laboratory
Barry Smith, Flatiron Institute, Simons Foundation

Workshop Description:
The Demands of resolution and fidelity have driven the performance of simulations of first-principles mathematical models in science and engineering from MegaFlop/s to ExaFlop/s and their datasets from MegaBytes to ExaBytes (12 orders of magnitude) over the past four decades. Over the most recent decade, the application of machine learning to science and engineering systems has created a similar demand for performance and associated storage. Lower levels of the software stack created for simulation have proved immediately useful for machine learning at scale. However, higher levels of the simulation software have not yet fulfilled their potential to lift the dominant algorithms for machine learning and inference today above relatively "brute force" implementations, resulting in massive costs for facilities and energy that slow progress and restrict access to the research frontier for many.

At the same time, hardware optimized for machine learning applications possesses yet unrealized potential for traditional simulation. Increasingly, the same science or engineering application is more effectively addressable by simulation and learning working in tandem than by either alone, resulting in a confluence of two formerly distinct research communities. This "hot topics" weekend aims to capitalize by highlighting opportunities for cross-fertilization in both directions.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":

- *It is great that the speakers were selected from diverse areas, which gave me opportunity to interact and think more outside my box. I also appreciate talking to the early career people and people from industry.*
- *I have discovered a new professional society of support, projects, funding streams, and more.*
- *I learned about analyzing algorithms in terms of memory movement; I also learned about the current trend towards hybrid computing architectures; I also learned enough about software such as PETSc that I want to use it now.*

Some workshop participants' comments on "Describe the highlight of this workshop.":

- *The highlight of this workshop is to meet the HPC leaders who are also my role models. Many senior people are very active and great leaders for the HPC community. I am very excited to meet and have long conversations with them.*
- *This meeting marked the 70th birthday of a field leader in HPC, so it was interesting to hear what others had to say of him and to him. This type of interaction does not show up*

in papers. It takes a special occasion. But maybe the highlight was to see many young scientists who I had never previously met respond so warmly to the chosen topic.
- *I feel like this workshop shifted the paradigm of how I want to work. I also really enjoyed the sense of community. It was one of the best and most impactful workshops I have attended.*

Hot Topics Workshop 4: Fluid Dynamics and Turbulence
Nov 22 - 23, 2025

Organizing Committee:
Theodore Drivas, Stony Brook University
Javier Gomez Serrano, Brown University
In-Jee Jeong, Seoul National University
Igor Kukavica, University of Southern California
Wojciech Ożański, Princeton University

Workshop Description:
This workshop focuses on advancing the mathematical understanding of fluid dynamics, particularly the intricate phenomenon of turbulence. It aims to explore recent breakthroughs in the analysis of fluid equations, such as the Navier-Stokes and Euler equations, addressing fundamental questions of well-posedness, singularity formation, stability, and anomalous energy dissipation.

The workshop will e*xplore cu*tting-edge mathematical techniques, including singularity formation, anomalous dissipation, convex integration, optimal transport, and regularity theory for partial differential equations.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic.":
- *I have seen new directions in connections between numerics and theoretical developments in fluid dynamics.*
- *By inviting leading researchers in the field, which gives the opportunity to get to know their research from first-hand and to talk with them. Also by having the facilities to accommodate theoretical and computational lectures.*
- *The topic of the workshop was a bit adjacent to my main current line of research. I know about computer-assisted proofs but less about fluids. It was great to see how those two pieces fit into one another thanks to the workshop!*

Some workshop participants' comments on "Describe the highlight of this workshop.":
- *Great work by local organizers! Scientifically, I loved seeing many young researchers present their breakthrough results.*
- *The time reserved between lectures and at the end of the day to make connections and talk with other attendees. It was very beneficial.*
- *It was a great event where I learnt a lot!*

Hot Topics Workshop 5: Coding for Fault-Tolerant Quantum Computing
Apr 11 - 12, 2026

Organizing Committee:
Jarod Hiram López, Virginia Tech
Gretchen Matthews, Virginia Tech
Narayanan Rengaswamy, The University of Arizona
Bane Vasic, The University of Arizona

Workshop Description:
Fault tolerance is essential for reliable quantum computation because quantum information (qubits) is inherently fragile. This workshop gathers experts on two primary, interconnected thrusts to advance fault-tolerant quantum computing: quantum low-density parity-check (qLDPC) codes and the Clifford hierarchy. Several families of qLDPC codes have been constructed recently, including quantum Tanner, hypergraph product, and lifted product codes. While they perform well when paired with iterative decoders, their capabilities remain to be fully understood. In particular, it remains an open question how to employ these constructions to achieve provably strong performance in practical (finite-length) settings and to describe decoding failures. Another key challenge is to leverage the Clifford hierarchy, the first two levels of which are the Pauli group and Clifford group, respectively. Because a classical computer can efficiently simulate the Clifford group, additional gates are needed for quantum computation. There are synergies across these thrusts, especially the theory of qLDPC codes that respect gates that support fault-tolerant quantum computing.

Some workshop participants' responses to "Please describe how ICERM has (or has not) added to your knowledge of experimental/computational methodologies and/or theoretical developments within this topic":

- *ICERM has given me the opportunity to learn of experimental/computational methodologies that I can combine with my current research plans. These new ideas look promising to keep expanding our knowledge in the field.*
- *The topics that were presented were new ways of constructing quantum codes and using algebraic techniques, which gave me insight to how these codes behave computationally and how they perform in terms of parameters.*
- *I learned a great deal about cutting edge developments in quantum error correcting codes.*

Some workshop participants' comments on "Describe the highlight of this workshop.":

- *Being able to talk with people who, although diverse in their background and approaches, are all united under one main direction and topic area, and who are all adequately serious about that topic.*
- *The highlight of the workshop for me was the talks. I enjoyed hearing from amazing professors who did groundbreaking research in the area.*
- *The highlights were the breadth of participants and the friendly, productive conversation.*

Program Promotions

ICERM programs and events are typically marketed through a variety of outlets: its website, dedicated social media (Facebook, Twitter, and Instagram) accounts, targeted email campaigns, placement of advertisements in mathematical journals and newsletters if requested by program organizers, ICERM directorate participation in conferences and exhibits, upcoming program fliers and announcements made available to ICERM participants, and various on-line math organization calendars (AMS, AWM, European Mathematical Society, National Math Institutes, and Conference Service Mandl). ICERM has discontinued the use of posters for large mailings as alternative digital advertising methods are effective, inexpensive and environmentally friendly.

ICERM's email database is made up of former and upcoming participants, local partners and community leaders, ICERM board members, academic and corporate sponsors, and the department managers from higher education math departments in both the U.S. and overseas. It currently has more than 18,000 contact emails.

Communications Plan

ICERM's various communications, funder acknowledgements, and presence on Brown's fundraising page have helped ICERM maintain contact with board members, corporate and academic sponsors, and the general mathematical research community.

ICERM's communications strategy emphasizes maintaining regular contact with recent, current, and upcoming program participants and amplifying scientific results from workshops and collaborations initiated at ICERM. To meet these objectives, ICERM has continued its semesterly (spring, summer, and fall) newsletter highlighting research fellows, scientific program outcomes, upcoming opportunities to visit ICERM, and various funding and career opportunities. Participants with significant scientific outcomes are invited to work with the director to share their results on mathinstitutes.org/highlights or in the ICERM newsletter. ICERM also maintains contact with Brown University's physical sciences communications manager to highlight ICERM researchers and programs in Brown's publications. In addition, frequent social media posts share workshop photos, high-interest events (e.g. GoGetMath), ICERM-Brown connections, and alumni achievements, increasing ICERM's visibility in the mathematical community and among prospective participants.

Organization/Infrastructure

ICERM's governing body is a Board of Trustees (BOT). The Scientific Advisory Board (SAB) oversees all scientific activities of the Institute and selects the scientific programs. The Education Advisory Board, or EAB coordinates the oversight of educational activities at all levels at ICERM.

Board of Trustees (BOT)

The Board of Trustees oversees all institute activities. This includes being responsible for reviewing the budget for the coming year, developing policies and procedures, advising on the

appointment of new directors and actively recruiting for the position as needed, and taking a leadership role in fundraising and public awareness. The Board of Trustees has a face-to-face meeting at ICERM for one day each year (usually in late spring), and one or two conference-call meetings if needed.

Board of Trustee member appointments are for four years. Chairs from the Scientific Advisory Board (SAB) and the Education Advisory Board (EAB), as well as the ICERM directors and co-PIs, are invited to sit in.

Board of Trustee Members:

Name	Institution
Liliana Bocera	Columbia University
Leon Bottou	Facebook
Jesús De Lorea	University of California, Davis
Lisa Fauci	Tulane University
Illya Hicks	Rice University
Tara Holm	Cornell University
Lois McInnes	Argonne National Laboratory
Andrea Nahmod	University of Massachusetts Amherst
Nataša Pavlović (Chair)	University of Texas
Daniel Szyld	Temple University
Carol Woodward	Lawrence Livermore National Laboratory

The following people rotated off the BOT at the end of June 2025: Rachel Kuske and Mark Lewis.

Note: The minutes from the May 19, 2025, annual Board of Trustees meeting can be found in Appendix D.

Scientific Advisory Board (SAB)

The Scientific Advisory Board is responsible for approving the programs and scientific activities of the Institute. In addition, through direct communication with the directors, Scientific Board members will be involved in shaping the direction of the scientific enterprise through specific suggestions of thematic programs, program organizers.

Terms are three years. The ICERM Directors act as ex officio members of this committee.

Scientific Advisory Board Members:

Name	Institution
Mina Aganagic	University of California, Berkeley
Guillaume Bal	University of Chicago
Ricardo Cortez	Tulane University
Ioana Dumitriu	University of California San Diego

Jordan Ellenberg	University of Wisconsin–Madison
Lior Horesh	IBM Research
Smita Krishnaswamy	Yale University
Michael Mahoney	University of California, Berkeley
Youssef Marzouk (Chair)	Massachusetts Institute of Technology
Anna Mazzucato	Pennsylvania State University
Konstantin Mischaikow	Rutgers University
Juliane Mueller	National Renewable Energy Laboratory
Kasso Okoudjou	Tufts University
Beatrice Riviere	Rice University
Andrew Sutherland	Massachusetts Institute of Technology
Jared Wunsch	Northwestern University

The following people rotated off the SAB at the end of June 2025: Jacob Bedroissian, Fioralba Cakoni, Eli Grigsby, Dana Randall, Eric Vanden-Eijnden.

Note: The minutes from the May 15, 2025, mid-year SAB conference call and the November 6-7, 2025, SAB annual meeting can be found in Appendix E.

Upcoming Programs

ICERM already has a number of programs scheduled to take place in the coming years. The listings below have already been approved by the Scientific Advisory Board and are in the process of being developed.

Semester Programs (each with three to four associated workshops)

Fall 2026

Computation on K3 surfaces and Related Varieties

J. Berg, P. Comparin, K. De Vleming, D. Festi, K. Kedlaya, A. Logan, A. Sarti, C. Salgado, A. Várilly-Alvarado

Spring 2027

Metric Algebraic Geometry: Going Global

P. Breiding, S. Di Rocco, J. Kileel, K. Kohn, L. Lerario, C. Meroni, J. Rodriguez, A. Seigal

Fall 2027

Applied and Computational Complex Analysis in the 21st Century

D. Crowdy, L. Cummings, L. Lanzani, S. Smith, B. Protas, T. Trogdon, J. Weideman

Spring 2028

Computational Number Theory at Scale

E. Assaf, J. Balakrishnan, E. Costa, J. Jones, W. Li, J. Paulhus, D. Roe, A. Sutherland

Fall 2028

Integrative Design of Numerical Methods for Evolutionary PDEs
S. Gottlieb, Z. Grant, J. Hu, D. Ketcheson, G. Russo

Topical Workshops

2026

1. **Techniques and Tools for the Formalization of Analysis**
   J. Gomez Serrano, J. Loreaux, H. Macbeth, P. Massot, T. Tao
2. **Asynchronous Methods for Numerical Linear Algebra**
   E. Chow, A. Fox, M. Lupo Pasini, A. Miedlar, K. Swirydowicz, D. Szyld
3. **Foundations of Computational Geometry and Topology**
   H. Adams, İ. Baykur, E. Chambers, B. Coskunuzer, J. Perea
4. **Modeling and Theory in Population Biology**
   E. Akçay, E. Huerta-Sanchez, S. Ramachandran, S. Schreiber, J. Wakeley
5. **Number Field Counting in the LMFDB**
   B. Alberts, P. Koymans, R. Lemke Oliver, D. Loughran, D. Roe
6. **Machine Computation in Homotopy Theory**
   B. Antieau, E. Belmont, D. Isaksen, D. Shi, Z. Xu
7. **Applied and Computational Discrete Algorithms in AI and Data Science**
   K. Hanauer, J. Langguth, H. Meyerhenke, S. Rajamanickam, N. Veldt
8. **Rigidity Theory Meets Geometric Data Science for Applications in Chemistry and Biology**
   O. Anosova, J. Anosova, S. Gortler, V. Kurlin, I. Streinu
9. **Mathematics of 3D Reconstruction**
   F. Arrigoni, T. Duff, J. Kileel, B. Kimia, G. Lerman
10. **Partial Differential Equations for Many Particles Systems**
    J. Bedrossian, J. Carrillo, Y.P. Choi, M. Colombo, M. Pia Gualdani, M. Tang
11. **Teaching Higher Category Theory with Computers**
    N. Rasekh, E. Riehl, J. Weinberger

2027

1. **Mathematical Analysis and Modeling of Maxwell's Equations in Complex Media**
   J. Li, M. Maier, C.H. Shu
2. **Advances and Challenges in Computational Partial Differential Equations**
   S. Gottlieb, F. Li, J. Qiu, J. Ryan
3. **Bridging Computational and Experimental Communities in Biological Fluid-Structure Interaction**

A. Barrett, B. Griffith, A. Hoover, O. Lewis, H. Nguyen, S. Olson, B. Thomases

4. **Numerical Linear Algebra in the Era of AI**
   J. Chen, L. Grigori, S. Xiaoye Li, Y. Saad, M. Stoll, Y. Xi
5. **Structure-Preserving Scientific Machine Learning**
   J. Actor, C. Eldred, S. Glas, A. Gruber, B. Krämer, H. Sharma
6. **Equivariant Geometry and Rationality Problems**
   S. Casalaina-Martin, I. Cheltsov, A. Duncan, I. Vogt, E. Yasinsky

Collaborate@ICERM

2026

1. **Tensor Analysis for Large-Scale Data**
   H. Cai, L. Huang, J. Qin, C. Wu
2. **Algebraic Geometry in Spectral Theory**
   J. Cobb, M. Faust, A. Kretschmer
3. **Mathematical Modeling, Deep Learning and Optimization on Graph Structured Data**
   W. Guo, R. Liu, Y. Lou, J. Qin, Y. Xu, L. Zhang
4. **Maximum-Entropy Sampling: Mathematics and Algorithms**
   K. Antreicher, M. Fampa, J. Lee, Y. Li, G. Oliveira da Ponte
5. **Effective Methods in Elimination Theory, Blowup Algebras, and Integral Dependence**
   L. Buse, Y. Cid-Ruiz, C. Polini, B. Ulrich
6. **Web Bases, Promotion, and Plabic Graphs**
   C. Gaetz, O. Pechenik, S. Pfannerer-Mittas
7. **Exploring the Graph-Theoretical Properties of Semi-Directed Phylogenetic Networks**
   B. Currie, E. Czabarka, M. Fischer, H. Simmons, L. Szekely, K. Wicke
8. **Noether-Lefschetz Theory in Higher Codimensions**
   R. Beheshti Zavareh, A. Dhillon, R Girivaru, A. Lopez, D. Raychaudhury, A. Tripathi
9. **Flows Through Permeable Membranes Using The Method of Regularized Stokeslets**
   R. Cortez, S. Khatri, M. Kubacki, B. Leathers, T. Pendelton, W. Strychalski
10. **Efficient Sampling of Scenarios in the Single Cut-and-Join Model**
    A. Cochran, N. Fox, M. Levet, H. Smith Blake, A. Wiedemann
11. **Characterizing Orbits of Semisimple Elements in Low Order Symmetric Spaces over Finite Fields**
    C. Buell, A. Helminck, V. Klima, C. Wright, E. Ziliak
12. **Reconstructing Phylogenetic Networks**
    Y. Alexandr, H. Banos, J. Coons, E. Gross, C. Long, N. Meshkat

12. **Learning Canonicalizations and Symmetries Through Force-Directed Evolution of Measures**
    D. Alvarez-Melis, R. Baptista, S. Chewy, A. Pooladian, G. Stepaniants, S. Villar
13. **Categorification of WRT invariants of 3-manifolds**
    Y. Qi, L. Robert, J. Sussan, E. Wagner
14. **A Computational Approach to Deformations**
    L. Grimley, N. Krawzik, C. Lawson, C. Uhl
15. **Expected Number of Positive Solutions for Random Polynomial Systems**
    A. Ergur, M. Telek, J. Tonelli-Cueto
15. **Microlocal Analysis of Singular Operators with Application to Nonlinear Models and Statistical Methods in Tomography**
    A. Abhishek, G. Ambartsoumian, R. Felea, H. Holman, V. Krishnan, C. Nolan, E. Quinto, J. Webber
16. **Understanding Solution-Free Sets**
    S. He, A. Kuchukova, J. Thompson, F. Wei

2027

1. **Plus-Pure Threshold of Some Hypersurface Singularities**
   B. Bailey, M. Benozzo, A. Brosowsky, V. Jagathese, A. LaClair, P. Ramírez-Moreno
2. **Data-Informed Analysis of Malaria Vector Species Replacement: Modeling IRSDriven Population Shifts in Uganda**
   M. Conrad, A. Gumel, M. McClure, B. Pant, Z. Qu, M. Teboh-Ewungkem
3. **Spaces of Generalized Nestings of Configurations**
   C. Lozano Huerta, T. Ryan, J. Sheridan
4. **Applications of Crystal Skeletons**
   S. Brauner, S. Corteel, Z. Daugherty, S. Mason, A. Schilling

Education Advisory Board (EAB)

The Education Advisory Board 1) oversees the undergraduate research programs and helps to develop and identify successful proposals; 2) helps to develop proposals for outreach programs and events that are aligned with the mission of the institute; and 3) helps to identify sources of funding for education and outreach activities.

Terms are three years. The ICERM Directors act as ex officio members of this committee.

Education Advisory Board Members:

Name	Institution
Paul Bendich	Duke University

Cathy Boutin	West Warwick School Department (Math)
Ron Buckmire	Marist College
Amalia Culiuc	Brown University
Malena Español	Arizona State University
Kathleen Kavanaugh	Clarkson University
Maria Klawe	Math for America
Ralph Morrison	Williams College
Julianna Tymoczko (Chair)	Smith College
Ulrica Wilson	Morehouse College

The following people rotated off the EAB at the end of June 2025: Darryl Yong

Note: The minutes from the September 2025 annual Education Advisory Board meeting can be found in Appendix F.

Mathematics Institute Directors (MIDs) Meeting

The April 2026 MIDs meeting minutes can be found in Appendix G.

ICERM's Early-Career Training and Mentorship

A special focus of the operations of the institute is the training and mentorship of younger and early-career mathematicians. Specific outreach programs and directed opportunities create connections between mathematicians at different stages in their careers. This includes ICERM's postdoctoral program, integration and support of graduate students in the context of semester programs, and summer research programs for undergraduates (Summer@ICERM). The addition of postdoctoral fellows (as described above) and graduate students is essential to the success of ICERM's programs.

Postdoctoral Program

ICERM's postdoctoral program brings early-career mathematicians to the institute in order to support and expand their research and to create lasting career collaborations and connections. ICERM supports postdoctoral researchers via stipends through two mechanisms: "Semester" postdoctoral fellows participate in a semester-length program and a smaller number of "Institute" postdoctoral fellows stay at ICERM for an academic year.

Recruiting and Selection of ICERM-funded Postdocs

ICERM's postdoctoral positions are widely advertised using MathJobs.org, print and online publications of the Society for Industrial and Applied Mathematics (SIAM), the American Mathematical Society (AMS), and on the ICERM website. These positions also are advertised at the NSF Institute Reception at the Joint Mathematics Meeting. ICERM collects applications via Mathjobs.org, an online job application service provided by the AMS.

ICERM sets an early January deadline for postdoctoral applications. Application review begins immediately and continues until the positions are filled.

The Postdoctoral Fellow Search Committee consists of the ICERM Semester Program organizers for the upcoming programs with input from the ICERM directors.

The program organizers review all of the applications and provide a rank-ordered list to the ICERM directors for each of the two types of positions (Semester and Institute postdocs). The directorate reviews the ranked lists and may suggest changes to ensure field balance. The director approves all offers and Brown University's Dean of the Faculty oversees postdoctoral offers and appointment terms.

2025-2026 ICERM Postdoctoral Cohort

ICERM Semester Postdoctoral Fellows and Associates (four months with benefits, funds for research travel):

Name	Previous Institution	ICERM Semester Program
Samuel Armon	University of Southern California	Fall 2025
Patricia Commins	University of Minnesota	Fall 2025
Alice Dell'Arciprete	University of York	Fall 2025
Scott Neville	University of Michigan	Fall 2025
Joseph Pappe	Colorado State University	Fall 2025
Yiyun He	University of California Irvine	Spring 2026
Ruhui Jin	University of Wisconsin-Madison	Spring 2026
Federica Milinanni	KTH Royal Institute of Technology	Spring 2026
Fan Tian	Tufts University	Spring 2026

ICERM Institute Postdoctoral Fellows and Associates (nine months with benefits, funds for research travel):

Name	Previous Institution	ICERM Semester Program
Matthieu Dolbeault	RWTH Aachen University	2025-2026: focus on Spring 2026

Tracking Former Postdocs (Institute and Semester)

ICERM Research Fellows are supported with a salary for one semester. ICERM expects that these postdoctoral fellows will be on leave from or will have deferred the start of another position. The institute makes every effort to keep in touch with its postdoctoral alumni in order to track their professional growth.

ICERM-funded postdocs *(to date)*	Period of Stay	Current Institution
Emre Esenturk	Fall 2011	Jesus College, University of Oxford
Jeffrey Haack	Fall 2011	Los Alamos National Laboratory
Andong He	**Fall 2011** - Spring 2012	Passed away in 2016
Ahmed Kaffel	Fall 2011	University of Wisconsin-Milwaukee

Daniela Tonon	Fall 2011	Università degli Studi di Padova
Dongming Wei	Fall 2011	Nazarbayev University
Cecile Armana	Spring 2012	Université de Lille
Anupam Bhatnagar	Spring 2012	Google
Alon Levy	Fall 2011 - **Spring 2012**	NYU | The Marron Institute
Bianca Viray	Spring 2012	University of Washington
Xiaoguang Wang	Spring 2012	Zhejiang University
Daniel Cargill	Fall 2012	Southern Methodist University
Arnab Ganguly	Fall 2012	Louisiana State University
Peng Hu	Fall 2012	Shanghai Luoshu Investments
Hao Ni	Fall 2012	University College London
Aaron Smith	**Fall 2012** - Spring 2013	University of Ottawa
Julio Andrade	Fall 2012 - **Spring 2013**	University of Exeter
Kwangho Choiy	Spring 2013	Southern Illinois University
Zajj Daugherty	Spring 2013	Reed College
Martina Lanini	Spring 2013	Università di Roma Tor Vergata
Ben Salisbury	Spring 2013	The Hartford
Ryan Greene	Fall 2013	KairoBit
BoGwang Jeon	Fall 2013	POSTECH Mathematics Institute
Rodolfo Rios-Zertuche	Fall 2013	Czech Technical University in Prague
Giulio Tiozzo	**Fall 2013** - Spring 2014	University of Toronto
Anastasiia Tsvietkova	Fall 2013	Rutgers University-Newark
Emily Kyle Fox	Spring 2014	The University of Illinois Urbana-Champaign
Danupon Nanongkai	Spring 2014	Max Planck Institute for Informatics
Amanda Redlich	Spring 2014	University of Massachusetts Lowell
Charalampos Tsourakakis	Spring 2014	University of Crete
Grigory Yaroslavtsev	Fall 2013 - **Spring 2014**	Independent Researcher
Ali Ahmed	Fall 2014	Information Technology University (Lahore); Director of CACTuS; CEO of Qult Technologies; CTO of TierMax AI
Ulas Ayaz	**Fall 2014** - Spring 2015	Google
Jacqueline Davis	Fall 2014	Arizona State University
Pawel Siedlecki	Fall 2014	Institute of Biochemistry and Biophysics PAS
Li Wang	Fall 2014	University of Minnesota
Tyler Helmuth	Spring 2015	Durham University
Marcin Lis	Spring 2015	Vienna University of Technology
Emily Russell	Fall 2014 - **Spring 2015**	Google
Xuan Wang	Spring 2015	Peking University
Samuel Watson	Spring 2015	A Priori Investments

Olga Balkanova	Fall 2015	Steklov Mathematical Institute of Russian Academy of Sciences
Sandro Bettin	Fall 2015	University of Genova
Edgar Costa	Fall 2015	Massachusetts Institute of Technology
Anna Medvedovsky	**Fall 2015** - Spring 2016	University of Arizona
James Weigandt	**Fall 2015** - Spring 2016	Lorain County Community College
Abel Farkas	Spring 2016	Flow Színház - Flow Theatre
Marta Canadell Cano	Fall 2015 - **Spring 2016**	Wallapop
Nishant Chandgotia	Spring 2016	Tata Institute of Fundamental Research
Zhiqiang Li	Spring 2016	Peking University; Beijing International Center for Mathematical Research
Polina Vytnova	Spring 2016	University of Surrey
Hannah Alpert	**Fall 2016** - Spring 2017	MathILy
Chaim Even-Zohar	Fall 2016	Technion - Israel Institute of Technology
Isaac Mabillard	Fall 2016	Google DeepMind
Greg Malen	Fall 2016	Skidmore College
Jose Alejandro Samper	Fall 2016	Pontificia Universidad Católica de Chile
John Wiltshire-Gordon	Fall 2016	float.trading
Sergey Dyachenko	Fall 2016 - **Spring 2017**	University at Buffalo
Seok Hyun Hong	Spring 2017	POSCO Research Institute
Cecilia Mondaini	Spring 2017	Drexel University
Olga Trichtchenko	Spring 2017	Western University
Xuecheng Wang	Spring 2017	Tsinghua University
Xiaoqian Xu	Spring 2017	Duke Kunshan University
Mario Bencomo	**Fall 2017** - Spring 2018	California State University, Fresno
Wei Li	Fall 2017	DePaul University
Shixu Meng	Fall 2017	University of Texas at Dallas
Yimin Zhong	Fall 2017	Auburn University
David de Laat	Spring 2018	Delft University of Technology
Maria Dostert	Spring 2018	Munters
Philippe Moustrou	Spring 2018	Université Toulouse Jean Jaurès
Yu Guang Wang	Spring 2018	Shanghai Jiao Tong University; University of New South Wales
Wei-Hsuan Yu	Fall 2017 - **Spring 2018**	National Central University
Daniel Bernstein	Fall 2018	Tulane University
Papri Dey	Fall 2018	University of California, Santa Cruz
Mareike Dressler	Fall 2018	University of New South Wales
Kathlén Kohn	Fall 2018	KTH Royal Institute of Technology
Sara Lamboglia	Fall 2018	Goethe-Universität
Dane Wilburne	Fall 2018	The MITRE Corporation
Marilyn Vazquez	Fall 2018 - **Spring 2019**	Simpson College

Shubhendu Trivedi	Fall 2018 - **Spring 2019**	Google DeepMind
Guangyao Zhou	Spring 2019	Google DeepMind
Gabriel Dorfsman	Fall 2019	St. Lawrence University
Alba Málaga Sabogal	**Fall 2019** - Spring 2020	Laboratoire de Mathématiques d'Orsay
Michael Musty	Fall 2019	Cold Regions Research and Engineering Laboratory
Martin Skrodzki	Fall 2019	Delft University of Technology
Steve Trettel	Fall 2019	University of San Francisco
Gregory Darnell	Fall 2019 - **Spring 2020**	Insitro
Davide Palitta	Spring 2020	University of Bologna
Jemima Tabeart	Spring 2020	Eindhoven University of Technology
Michael Schneier	Spring 2020	University of Pittsburgh
Min Wang	Spring 2020	University of Houston
Stefan Czimek	**Fall 2020** - Spring 2022	Leipzig University
Martin Licht	Fall 2020	Technical University of Dresden, Germany
Jacob Lange	Fall 2020	University of Texas at Austin
Caroline Mallary	Fall 2020	University of Massachusetts Dartmouth
Zachary Nasipak	Fall 2020	University of Southampton
Brendan Keith	Fall 2020	Brown University
Sunita Chepuri	Spring 2021	University of Puget Sound
Netanel Friedenberg	Spring 2021	Tulane University
Sean Griffin	Spring 2021	University of North Texas
Daoji Huang	Fall 2020 - **Spring 2021**	University of Massachusetts Amherst
Gleb Nenashev	Spring 2021	St. Petersburg State University
Louise Gassot	**Fall 2021** - Spring 2022	Mathematics Institute of Rennes (IRMAR)
Amirali Hannani	Fall 2021	University of Geneva
Kyle Liss	Fall 2021	University of South Carolina
Anastassiya Semenova	**Fall 2021** - Spring 2022	Rochester Institute of Technology
Annalaura Stingo	Fall 2021	École Polytechnique France
Jiaqi Yang	**Fall 2021** - Spring 2022	Clarkson University
Antonio Alfieri	Spring 2022	McGill University
Lei Chen	Spring 2022	Chinese Academy of Sciences
Jonathan Johnson	Spring 2022	Sam Houston State University
Sudipta Kolay	Fall 2021 - **Spring 2022**	SAS: Data and AI Solutions
Nancy Scherich	Fall 2021 - **Spring 2022**	Elon University
Hannah Turner	Spring 2022	Stockton University
Yvon Verberne	Spring 2022	University of Western Ontario
Alexandros Eskenazis	Fall 2022	Sorbonne University
Fushuai Jiang	Fall 2022	City University of Hong Kong

Michael Roysdon	**Fall 2022** - Spring 2023	University of Cincinnati
Masana Naga Vempati	Fall 2022	Louisiana State University
Katarzyna Wyczesany	Fall 2022	University of Leeds
Sudan Xing	Fall 2022	University of Arkansas at Little Rock
Sean Kafer	Spring 2023	Georgia Institute of Technology
Chiara Meroni	Spring 2023	ETH Institute for Theoretical Studies
Bento Natura	Spring 2023	Columbia University
Nimita Shinde	Fall 2022 - **Spring 2023**	University of Texas Southwestern Medical Center
Shixuan Zhang	Fall 2022 - **Spring 2023**	Texas A&M University
Robyn Brooks	Fall 2023	University of Utah
Tom Burns	Fall 2023	Okinawa Institute of Science and Technology
Vasiliki Liontou	Fall 2023	University of Bologna
Marissa Masden	**Fall 2023** - Spring 2024	University of Puget Sound
Nikola Milićević	Fall 2023	University of Texas El Paso
Ling Zhou	Fall 2023	Duke University
John Carter	Spring 2024	Rensselaer Polytechnic Institute
Sijing Liu	Fall 2023 - **Spring 2024**	State University of New York
Henry von Wahl	Spring 2024	Friedrich Schiller University Jena
Yukun Yue	Spring 2024	University of Wisconsin-Madison
Maize Curiel	**Fall 2024** - Spring 2025	TBD
Dimitrios Diamantidis	**Fall 2024** - Spring 2025	Indiana University, Bloomington
Marina Garrote-López	Fall 2024	Universitat Pompeu Fabra
Max Hill	Fall 2024	University of Hawai'i at Mānoa
Joshua Justison	Fall 2024	University of Wisconsin-Madison
Sungsik Kong	**Fall 2024** - Spring 2025	RIKEN
Nicholas Barvinok	Spring 2025	Georgia Institute of Technology
Dániel Garamvölgyi	Spring 2025	Eötvös Loránd University
Zeyuan He	Fall 2024 - **Spring 2025**	RWTH Aachen University
Matthias Himmelmann	Spring 2025	Technical University of Braunschweig
Alison La Porta	Spring 2025	KU Leuven
William Sims	Spring 2025	University of Florida
Jack Southgate	Spring 2025	Whole Life Consultants Limited
Samuel Armon	Fall 2025	Ipsos
Patricia Commins	Fall 2025	LACIM at University of Quebec at Montreal
Alice Dell Arciprete	Fall 2025	Ruhr-Universität Bochum
Scott Neville	Fall 2025	LACIM at University of Quebec at Montreal
Joseph Pappe	Fall 2025	Colorado State University

Matthieu Dolbeault	Fall 2025 - **Spring 2026**	University of Nantes
Yiyun He	Spring 2026	University of California, San Diego
Ruhui Jin	Spring 2026	Johns Hopkins University
Federica Milinanni	Spring 2026	Northwestern University
Fan Tian	Spring 2026	University of North Carolina at Chapel Hill

Graduate Students

Support for Graduate Students

The research semester program budget typically includes partial support for a cohort of graduate students. Applicants include graduate students working with visitors to the program, as well as students who intend to attend without an advisor. Graduate students must arrange for a letter of recommendation from their advisor to be sent separately. The graduate student applications are prioritized by the semester program organizing committee (1 - Would make a contribution to this program; 2 - Desirable for this program but not high priority; 3 - High priority, important for the success of the program). The prioritized list is subsequently reviewed by the deputy director overseeing the development of that particular program. Final decisions are made by the directors. The ability to provide a mentor for each graduate student in residence is a factor in the decision.

Training and Mentoring Programs

Before a semester program starts, ICERM attempts to assign a mentor to each postdoc and graduate student. The institute provides all senior mentors with written guidelines that spell out their responsibilities and the responsibilities of mentees. Currently, the assigned ICERM deputy director coordinates these efforts and works with the members of the Program Organizing Committee assigned to be responsible for mentorship.

The mentoring program for the Institute Postdoctoral Fellows necessarily includes a plan for the "off semester" when these postdocs are "in residence" at ICERM while there is no active research program in their area. In most cases, postdocs are matched with mentors at Brown in Math, Applied Math, or Computer Science in order to continue their ICERM research.

ICERM Postdoctoral Participant and Mentor List, by Semester Program

Postdoc	**Mentor**	**Program/How Supported**
Samuel Armon	M. Vazirani	Fall 2025 Semester Postdoc (NSF Funds)
Patricia Commins	A. Schilling	Fall 2025 Semester Postdoc (NSF Funds)
Alice Dell'Arciprete	A. Kleschev	Fall 2025 Semester Postdoc (NSF Funds)
Scott Neville	J. Simental Rodriguez	Fall 2025 Semester Postdoc (NSF Funds)
Joseph Pappe	I. Halacheva	Fall 2025 Semester Postdoc (NSF Funds)
Yiyun He	S. Mou and A. Saibaba	Spring 2026 Semester Postdoc (NSF Funds)
Ruhui Jin	M. Chung	Spring 2026 Semester Postdoc (NSF Funds)
Matthieu Dolbeault	Y. Marzouk	Spring 2026 Institute Postdoc (NSF Funds)

Federica Milinanni	E. Somersalo	Spring 2026 Semester Postdoc (NSF Funds)
Fan Tian	F. Sanogo and J. Chung	Spring 2026 Semester Postdoc (NSF Funds)

Roundtable Discussions

To prepare graduate students and postdocs better for their future careers, the institute organizes regular roundtable discussions with long-term visitors, Brown faculty, and directors. In the course of each semester, the discussions cover the following topics:

- Preparing job applications
- Writing and submitting papers
- Writing grant proposals
- Ethics in research as required by NSF (mandatory; attendance is taken)
- Research security and export control training (mandatory; attendance is taken)
- Job opportunities in industry and government labs

Peer-to-Peer Discussions

Semester programs offer regularly scheduled seminars to postdocs and graduate students, expressly limited to junior researchers. This gives participating postdocs and graduate students an opportunity to discuss research topics and any other issues openly without senior researchers present. The format is completely flexible. For example, it could feature talks by postdocs or graduate students on their current research or provide an opportunity to read and report on papers, or give an introduction to upcoming talks in other seminars. The group could even ask a senior participant to give a tutorial lecture and then follow up with a discussion session afterwards.

ICERM makes all of its resource materials for its graduate students and postdoctoral fellows available to the general public on its website at: https://icerm.brown.edu/pds/

Summer Undergraduate Research Program

Summer@ICERM is an eight-week summer research program for 16-20 undergraduates. Students work in small groups, typically in pairs, supervised by faculty advisors and assisted by TAs. In addition to research projects, the program includes topical mini-courses and colloquium-style lectures given by invited speakers. Students present their findings at a symposium at the end of the program.

1. Solicitation of Proposals

ICERM solicits and recruits proposals from faculty nationwide. Faculty organizers and TAs are required to be in residence for a minimum of six of the eight weeks, especially the first and last week of the program.

2. Future Proposal Selection

Programs are selected from proposals submitted to ICERM in an open competition. Successful programs typically have a significant computational component. Proposals are reviewed and

prioritized by the Education Advisory Board, which usually offers substantive feedback to the proposers.

3. Application Process

Undergraduates apply to the program through MathPrograms.org and participants are selected from a talented pool of students currently enrolled in U.S. universities and colleges. A small number of international participants also may be admitted.

4. Applicant Selection

Undergraduate participants are selected by the Summer@ICERM faculty organizers and the selections are finalized by ICERM director(s). We seek students whose academic and professional trajectory might be changed through a summer at ICERM. Cohorts include students from R1 research institutions, comprehensive universities, and liberal arts colleges. To ensure a diverse group of applicants, ICERM advertises widely. We seek the following dimensions when evaluating candidates: interest and initiative, aptitude and preparation, ability to create an inclusive and supportive environment, perseverance, and potential for the program to influence future trajectory.

Financial Decisions for Program

Faculty and TAs receive a stipend and travel support; faculty also receive partial or full support for lodging. Undergraduate participants funded by ICERM receive a stipend, funds for travel within the United States, meals, and accommodation in a Brown dormitory.

Summer@ICERM 2025: Building Useful Insights from Local Data

Jun 9 - Jul 25, 2025

Organizing Committee:
Jeffrey Humpherys, Missouri University of Science & Technology
Rachel Levy, North Carolina State University Data Science Academy
Mohammad Meysami, Clarkson University
Katherin Socha, Northeastern University

Program Description

Led by experienced faculty and graduate student teaching assistants, participating undergraduates will spend seven weeks learning how to collaborate, engage in data science, and conduct research as a team. The goal of Summer@ICERM 2025: Building Useful Insights from Local Data through Sustainable partnerships (BUILDS) is to introduce students with limited experience to the field of data science through projects related to issues such as global food systems, food production, and food security.

Imagine you are making recommendations to a coffee shop about how to decide how much milk to purchase each week, based on data they have collected. You might be working with coffee shops in three different places that all have similar problems, but don't have exactly the same information or needs. If your team can build a flexible enough solution so that your client can

input local information about their situation and get a recommendation, your solution will potentially be useful to a larger variety of coffee shops.

Data science is the process of turning information into insights. In this program, you will learn to address local and global data science challenges broadly related to the theme of food posed by community partners. Your goal will be to develop flexible solutions that could work for community partners who have similar challenges but different local contexts. Faculty leaders will help you learn how to communicate your solutions to audiences that may not have a technical or data science background. They will also provide information and encourage you to think about how the things you are learning might connect to future educational pathways, internship opportunities, and careers.

2025 Summer@ICERM Cohort

The Summer@ICERM 2025 program had a cohort of 17 students and four teaching assistants. All of them were funded through the NSF.

Student Name	Institute	Funding Source
Amulya Bollapragada	North Carolina State	ICERM
Calvin Chiu	Wesleyan University	ICERM
Sidor Clare	Marquette University	ICERM
Maggie Davis	Colorado College	ICERM
Brent Foxworth	Morehouse College	ICERM
William Grenville	Swarthmore College	ICERM
Audrey Lee	Amherst College	ICERM
Si Lee	Boston College	ICERM
Uma Mandapti	Worcester Polytechnic Institute	ICERM
Elizabeth McClure	Wake Technical Community College	ICERM
Kumkum Nema	University of Oregon	ICERM
Azael Perez	The University of Texas Rio Grande Valley	ICERM
Danielle Sitalo	Texas A&M University	ICERM
Freya Trumbull	University of Connecticut	ICERM
Edwin Vazquez Vega	Inter-American University of Puerto Rico, Bayamón Campus	ICERM
Brent Wong	Brown University	ICERM
Richard Zhang	Cornell University	ICERM

Here follows a sample of the most substantive comments from Summer@ICERM participants:
Some participant comments for “Describe the highlight of this program”:

- *I think two of my favorite parts of this program were making new friends and creating a project I am proud of. The people I met at ICERM were incredibly kind and welcoming. We all encouraged each other to learn and grow. These people made the experience so much fun. I am also really proud of how my project turned out. This is my greatest accomplishment and I am eager to share my work at other meetings if possible!*

- *The highlight was meeting the faculty leaders, TAs, and other students and forming lasting connections.*
- *The final presentation was the highlight of the program for me. It was nice to see how far we had come.*

Posters Presented at JMM 2026

- **Food Spoilage Mathematical Modeling and Analysis**
    - **Abstract:** A significant portion of global food waste arises from spoilage during transport and sale, creating economic and social challenges for food security. To better understand and mitigate this problem, we developed a mathematical framework inspired by the Kermack McKendrick model to represent the transition of food items from fresh to spoiled to removed. In the absence of relevant real-world datasets, the model was tested using simulated data, with parameter estimation methods applied to refine its fit. Additionally, machine learning techniques such as Random Forest Regression were used to capture spoilage trends and assess predictive accuracy. Our goal was to establish a reliable baseline model that can be refined once real-world data becomes available. The results indicate that Random Forest Regression provides a useful foundation for predicting spoilage behavior but tends to underpredict extreme spoilage events, likely due to model averaging and depth limitations. Nonetheless, combining our mathematical framework with machine learning methods can help isolate critical points where spoilage drives significant waste, which offers potential for targeted interventions.
        - **Presenting Authors:** Danielle Sitalo, Uma Mandapati
- **Identifying Food Deserts In Rhode Island**
    - **Abstract:** SNAP is a federal program that provides food purchasing assistance to low-income households. However, food deserts—areas where affordable, nutritious food is difficult to access—pose major barriers for families relying on SNAP. This project seeks to identify where SNAP recipients lack access to vendors and to guide resource allocation for food desert remediation. We reviewed existing classifications and found the USDA's method to be compelling, but limited by its binary approach and reliance on Euclidean distance. First, we divided Rhode Island by census tract, then into square kilometers, assigning centroids to represent all areas, just like the USDA. However, to improve upon their method, we used the Google Maps API to measure time and distance from each centroid to the nearest SNAP-authorized grocery store. We then trained an Extreme Gradient Boost Classifier, fitting these data to USDA classifications. The model produced tract-level scores (0–100) estimating the probability of being a food desert, offering a more nuanced gradient rather than a simple "desert/no desert" binary. Mapping these results revealed varying levels of accessibility across the state. These preliminary results show a more nuanced picture to food insecurity than "desert" or "no desert" that reflects the complex nature of food insecurity. As such, we demonstrate the aptitude of mathematical and data science methods towards improving the problem of food insecurity, particularly in regards

to identifying the individuals and communities in Rhode Island who require food assistance the most. We hope to expand these results to the greater United States in the near future, as well as to further refine our models through tuning relevant factors.
        - **Presenting Authors:** Calvin Chiu, Brent Foxworth, Si Hyun Lee, and Richard Zhang
- **Exploring the Distribution of Neonatal Health Outcomes through WIC Coverage Rates and Lifestyle Factors**
    - **Abstract:** This research explores the distribution of neonatal health conditions across the U.S. and their relationship to demographics, government assistance, and lifestyle factors. The goal was to determine how well the Women, Infants, and Children (WIC) program was reaching pregnant, low-income mothers and improving their health outcomes. Women face unique neonatal health challenges during pregnancy that can affect both mother and child during pregnancy and in the following years. Without medical and nutritional resources, maternal and child public health will likely be in poor condition and constant hospital expenses can lead to financial burdens on impacted individuals. Techniques including principal component analysis, k-means clustering, t-tests, and linear regression were used in this research. Results show that lifestyle factors such as smoking and lack of access to exercise were significantly worse in less healthy areas. The WIC assistance program reached high-need counties based on poverty and obesity rates but left other counties underserved, especially wealthy counties with high food insecurity rates. These findings could influence policy makers focused on improving public health and food insecurity rates.
        - **Presenting Authors:** Amulya Bollapragada, William Grenville, Freya Trumbull

The Evaluation Process: Measure to Evaluate Progress

Current Program Evaluation

ICERM concluded its contract with external evaluation vendor Strategic Research Group (SRG) during this reporting period. All evaluation responsibilities have transitioned in-house, with institute staff relying on internal Qualtrics surveys and ICERM's proprietary database to gather, track, and manage outcome data.

To evaluate immediate programmatic outcomes, ICERM utilizes survey reporting templates that analyze data collected right after a program or workshop to gauge its scientific success. In this way, ICERM uses survey patterns to refine institute operations and logistics, while providing feedback directly to program organizers so they can evaluate scientific impact, ultimately leveraging these insights to support the scientific success of future programming.

Note: Exit survey summaries for core programs run during this reporting cycle (May 1, 2025 through April 30, 2026) can be found in Appendix H.

Reported Scientific Outcomes/Projects Initiated

ICERM continues to improve how it collects research outcomes from past participants. Rather than relying on two- and five-year survey instruments, institute staff reach out directly to past participants and organizers to gather updates on publications, preprints, and projects resulting from their time at ICERM. For example, one year after Collaborate@ICERM groups meet, we ask them for information about publications, research products, and proposals that came out of their work. This outreach effort remains an evolving process as ICERM staff works toward establishing a more consistent workflow for capturing these outcomes.

As publication details are received, ICERM staff members enter the data manually into Cube, ICERM's internal database, which feeds the research listings shown on the respective program web pages. To date, staff members have catalogued more than 1,200 publications for semester programs in Cube. While gathering and verifying this volume of data remains a labor-intensive work in progress, ICERM aims to continue building out these records and expanding coverage on program pages as staff capacity allows.

Note: A list of publications attributed to ICERM programs since the 2024-2025 annual report can be found in Appendix I.

Corporate and Academic Sponsorship

Several math institutes currently funded by the NSF employ corporate and university-sponsored programs with tiered memberships. ICERM launched its own unique corporate and academic sponsorship programs in 2011.

The Corporate Sponsorship program has a $5,000 annual membership fee. To date, ICERM has received $92,500 in corporate sponsorship funds.

The Academic Sponsorship has an annual membership fee of $1,500 for domestic memberships with small graduate student programs, $3,000 for domestic membership with large graduate student programs, and $5,000 for international membership. To date, ICERM has received $99,375 in academic sponsorship funds. Academic sponsors have included:

- Cornell University, Department of Mathematics
- Indiana University Bloomington, Department of Mathematics
- Korea Advanced Institute of Science and Technology, Department of Mathematical Sciences
- Michigan Technological University, Department of Mathematical Sciences
- Worcester Polytechnic Institute, Mathematical Sciences Department

External Support

ICERM's staff works to develop new sources of support for ICERM's programs. The duties of Associate Director of Finance and Administration Jenna Sousa include managing both public and private grants, managing the proposal process, and ensuring the completion of follow-up reporting. Director Brendan Hassett and Associate Director Sousa manage relations with the

institute's sponsoring corporations and serve as liaisons to Brown's Division of Advancement, which unites Alumni Relations, Development, Corporate and Foundation Relations in a single, focused operation.

In addition to NSF funding, ICERM receives substantial in-kind financial support from Brown University. The director is released from teaching.. In addition, ICERM is not charged for the use and maintenance of its building or for custodial services.

Other Funding Support received in 2025-2026

Additional Gifts	*Amount*
MathWorks	$ 1,700.00
(for GoGetMath@ICERM)	
Subtotal	**$ 1,700.00**
University Funding Support	
University Research Committee	$ 75,000.00
Subtotal	**$ 75,000.00**
Sponsor Support	
Academic Sponsors	$ 5000.00
Corporate Sponsors	$ 0.00
Individual Sponsors	$ 0.00
Subtotal	**$ 5,000.00**
TOTAL	**$ 81,700.00**

Outreach Activities

GoGetMath@ICERM

For 12 years, ICERM has secured funding to run its well-received youth program, GoGetMath@ICERM. The program is led by Brown faculty members Amalia Culiuc, assistant teaching professor in the Division of Applied Mathematics and Anarina Murillo, assistant professor of biostatistics.

The program's founding organizers, Katharine Ott and Amanda Tucker, developed curricula for topics such as cryptography, image processing, the game Set, and recommendation systems. During the pandemic, an abbreviated, asynchronous version of the program was made available to applicants as well as the general public. Videos of Ott and Tucker presenting a selection of modules related to the GoGetMath curriculum (as well as some downloadable activities) remain on ICERM's website.

GoGetMath was designed to motivate young students to consider careers in mathematics, computation, and quantitative fields. Its affirming environment encourages participants to explore and invites them to excel in the mathematical sciences.

The program inspires 20-25 participants to love math by:

- demonstrating through hands-on activities, games, and computer simulations that the study of mathematics can be exciting, fun, and useful;
- introducing the high-school participants to career opportunities in which sophisticated mathematical ability plays a key role, emphasizing the central role mathematics plays in success in STEM careers;
- providing the participants with a support group of like-minded peers and mentors.

GoGetMath's Broader Impact

The mentorship provided to the participants has been specifically designed by those with experience in outreach to meet a key set of needs identified by research as being most likely to make a difference in the way students view mathematics and STEM disciplines. The program content is created by mathematicians who collectively have many years of experience as researchers and educators. The content is crafted to be at the appropriate level for the participants, but also challenging and practical. The selected topics showcase the beauty and depth of mathematics.

EPSCoR

ICERM supports the National Science Foundation's EPSCoR mission: "To enhance the research competitiveness of targeted jurisdictions (state, territory, or commonwealth) by strengthening science, technology, engineering and mathematics (STEM) capacity and capability through a diverse portfolio of investments from talent development to local infrastructure."

EPSCoR goals are:

1. to provide strategic programs and opportunities for EPSCoR participants that stimulate sustainable improvements in their R&D capacity and competitiveness;
2. to advance science and engineering capabilities in EPSCoR jurisdictions for discovery, innovation, and overall knowledge-based prosperity.

ICERM hosted 284 researchers from EPSCoR states in the 2025-2026 year.

Accepted ICERM Participants from EPSCoR States (May 1, 2025 - April 30, 2026)

EPSCoR State	# of ICERM Participants
Alabama	9
Alaska	6
Arkansas	2

Delaware	2
Hawaii	3
Idaho	1
Iowa	7
Kansas	10
Louisiana	13
Maine	9
Mississippi	3
Missouri	5
Nevada	3
New Hampshire	18
New Mexico	14
North Dakota	1
Oklahoma	8
Rhode Island	123
South Carolina	1
Tennessee	12
Utah	15
Vermont	4
West Virginia	2
Wyoming	1
Total	**284**

Administration and Staff

ICERM directors who received funding from the NSF core grant during this reporting cycle were Javier Gómez Serrano, Caroline Klivans, Benoit Pausader, Jill Pipher, Kavita Ramanan, and Bjorn Sandstede. Brendan Hassett committed 67% time.

ICERM Staff

Events Team

Teresa Fitzsenry, program manager, hired October 2016: reports to the Associate Director of Finance and Administration. Responsible for the implementation of ICERM's scientific research programs; manages a program timeline and program guide for each program, adhering to all programmatic deadlines and budgets. Major responsibilities include coordinating the housing, coordinating all communications regarding the arrival and orientation of long-term and short-term visitors; sending and tracking invitations and applications, and assisting with creating a program schedule.

Allison Foster, program coordinator, hired August 2024: reports to the Program Manager. Coordinates all logistical aspects of the fall semester/later summer programs and workshops. Acts as the main point of contact and customer support for ICERM visitors; sends and tracks speaker invitations, coordinates visitor housing, and enters participant data into ICERM's Cube database. Assists the program manager and associate director with other activities, such as social media and other marketing, as needed.

Steven Freund, program coordinator, hired July 2022: reports to the Program Manager. Coordinates all logistical aspects of the fall semester/later summer programs and workshops. Acts as the main point of contact and customer support for ICERM visitors; sends and tracks speaker invitations, coordinates visitor housing, and enters participant data into ICERM's Cube database. Assists the program manager and associate director with other activities, such as social media and other marketing, as needed.

Finance Team

Don Calitri, grants and financial specialist, hired December 2023: reports to the associate director of finance and administration. Supports grant proposal submissions, general grant and financial management and reporting. Engages with intracampus departments to resolve issues that arise within financial, human resources, and grant domains.

IT Team

Erik Brunnenmeyer, IT support coordinator, hired September 2023: reports to the director of IT. Provides A/V support for the institute's programs and events as well as technical support for program participants.

João Dos Santos, senior application developer, hired March 2022: reports to the director of IT. Performs application testing, development, and maintenance, including development/coding, testing, and ongoing maintenance of the department's front-end applications, back-end applications, java application servers, and databases.

Departed Staff Members and Directors

Monique Bandaronek, financial coordinator, hired August 2024, departed November 2025: reported to the associate director of finance and administration. Served as primary point of contact for ICERM staff, program organizers, visitors, postdocs, students, vendors, and sponsor agencies for all financial transactions and related issues; reconciled the day-to-day financial activity for expenses supported by sponsored projects and University-appropriated budgets.

Misha Kilmer is a William Walker Professor of Mathematics at Tufts University and an ICERM deputy director (through June 2025). She has a secondary appointment in the Department of Computer Science at Tufts University and a co-PI of Tufts TRIPODS Institute. She has been a Tufts Data Intensive Studies Center (DISC) Faculty Fellow since January 2021. In 2019, Misha was named a Fellow of the Society for Industrial and Applied Mathematics (SIAM) "for her fundamental contributions to numerical linear algebra and scientific computing, including ill-posed problems, tensor decompositions, and iterative methods." She served as chair of the Tufts Department of Mathematics from 2013 to 2019. She is a 2001 recipient of the Tufts Undergraduate Initiative in Teaching Award and was promoted directly from assistant to full professor in 2005.

Nathaniel Whitaker is a professor emeritus at the University of Massachusetts Amherst. As associate director of ICERM (through June 2025), he provided supervision and support to current research programs, assisted in the development of future events, and was involved in strategic institute planning. From 2018 to 2024, Nathaniel was chair of the Department of Mathematics and Statistics at UMass Amherst, which he joined in 1987. He has held positions as a visiting research professor at L'École Normale Supérieure de Lyon and interim dean of the College of Natural Sciences at UMass Amherst. Nathaniel's research primarily focuses on the development of numerical algorithms for applied differential equations using finite difference methods, spectral methods, and nonlinear optimization. He has been selected to join key mathematics initiatives both academic and national, including several AMS and SIAM steering committees and two National Science Foundation committees of visitors in 2017 and 2020. Nathaniel has received numerous awards throughout his career for his sustained work on mathematics outreach. In 2024, he was named a SIAM Fellow in recognition of his outreach efforts and notable academic contributions to fluid mechanics and applied mathematics.

Allison Zzie, financial coordinator, hired January 2026, departed May 2026: reported to the associate director of finance and administration. Served as primary point of contact for ICERM staff, program organizers, visitors, postdocs, students, vendors, and sponsor agencies for all financial transactions and related issues; reconciled the day-to-day financial activity for expenses supported by sponsored projects and University-appropriated budgets.

ICERM PI and Director Biographies

Brendan Hassett (director) joined the Brown faculty in 2015 as a professor of mathematics. He assumed the directorship of ICERM in July 2016. Brendan received his Ph.D. from Harvard University in 1996, spent four years at the University of Chicago, then joined the faculty of Rice University in 2000. He was the chair of the mathematics department at Rice from 2009 to 2014. He has also held visiting positions at the Mittag-Leffler Institute in Stockholm, the Chinese University of Hong Kong, and the University of Paris. Brendan's research focus is algebraic geometry: the study of geometric objects that are defined as solutions to polynomial equations. He has written 80 research papers and has authored and co-edited eight books. His work has been recognized with a Sloan Research Fellowship, a National Science Foundation CAREER award, and the Charles W. Duncan Award for Outstanding Faculty at Rice. Brendan is a Fellow of the American Mathematical Society and the American Associated for the Advancement of Science.

Mathew Borton was one of ICERM's first employees, hired in December 2010. As the director of information technology, he brings big-picture, strategic development skills to the institute. He oversees all daily IT and technology-related operational activities, ensuring IT security and stability. Mat acts as the liaison to the Brown University's IT community. Besides supporting the scientific activities within the institute, his responsibilities include overseeing the support of administrative IT and A/V equipment and the development and support of key web interfaces and databases. Mat received his B.S. in Information Technology and his M.S. in Technology – Information Security, both from Purdue University.

Javier Gómez Serrano is professor of mathematics at Brown University. His interests include partial differential equations, fluid mechanics, computer-assisted proofs, machine learning, spectral geometry, and analysis. He took his Ph.D. from the Universidad Autonoma de Madrid in 2013 and held positions at Princeton, and the Universitat de Barcelona before joining Brown in 2022. Along with Terence Tao of UCLA, he has been working with a team at Google DeepMind to help develop AlphaEvolve, a Gemini-powered coding agent for designing advanced algorithms. He is the recipient of a Vicent Caselles Mathematical Research Award from the Spanish Royal Mathematical Society and the BBVA Foundation, an Antonio Valle Prize, Antonio Ambrosetti Medal, the CRM Aisenstadt Chair, the MCA prize, and the 2026 Brown University Research Achievement Award.

Jeffrey Hoffstein is professor of mathematics at Brown University, as well as an ICERM consulting associate director. He received his Ph.D. in mathematics from the Massachusetts Institute of Technology in 1978. After holding postdoctoral positions at the Institute for Advanced Study, Cambridge University, and Brown University, Jeff was an assistant professor and associate professor at the University of Rochester. He came to Brown as a full professor in 1989. His research interests are number theory, automorphic forms, and cryptography. Jeff has written more than 70 papers, has co-authored an undergraduate textbook in cryptography, and jointly holds 10 patents for his cryptographic inventions. He was a co-founder of Ntru Cryptosystems, Inc., which was acquired by Qualcomm.

Caroline Klivans is a professor of applied mathematics at Brown University and an ICERM deputy director emerita. As deputy director of ICERM from 2020-2024, Caroline's responsibilities included overseeing semester programs and other institute activities such as summer programming and special events and assisting in solicitation and development of programs, workshops, and grant proposals to support institute activity. Prior to becoming a deputy director, she served as an ICERM associate director from 2015-2020, where her focus was on mentoring and professional development programs for students and postdoctoral fellows. Caroline received a B.A. in mathematics from Cornell University and a Ph.D. in applied mathematics from the Massachusetts Institute of Technology. Before joining Brown, she held positions at the Mathematical Sciences Research Institute (MSRI, now known as SLMath) and the University of Chicago. Her research is in algebraic, geometric, and topological combinatorics.

Benoit Pausader, a co-PI on the ICERM grant, is a professor of mathematics at Brown University and chair of the mathematics department since July 2024. Benoit received his Ph.D. from the University of Cergy-Pontoise. He has held appointments at New York University, the Centre National de la Recherche Scientifique in France, and Princeton University. His current position at Brown marks his second appointment to the Brown faculty; from 2008-2011 he was a Tamarkin Assistant Professor. Benoit studies partial differential equations, especially equations coming from physics such as the nonlinear Schrodinger equation, the Euler-Maxwell system, and the Water Wave system. He has received two grants from the National Science Foundation and was named a Sloan Research Fellow in Mathematics in 2014 and a Simons Fellow in 2021. In 2026, he was an invited speaker at the International Congress of Mathematicians.

Jill Pipher is the Elisha Benjamin Andrews Professor of Mathematics at Brown University and ICERM's founding director emerita. She served as Brown University's vice president for research through June 2024. Jill served as chair of the mathematics department in 2005-2008. Jill received her Ph.D. from UCLA in 1985 and came to Brown in 1990 as an associate professor from the University of Chicago. Her research interests include harmonic analysis, partial differential equations and cryptography. She jointly holds four patents for the NTRU encryption and digital signature algorithms and was a co-founder of Ntru Cryptosystems, Inc., now named OnBoard Security. Her awards include an NSF Postdoctoral Fellowship, Presidential Young Investigator Award, Mathematical Sciences Research Institute Fellowship, and an Alfred P. Sloan Foundation Fellowship. She served as president of the Association for Women in Mathematics (AWM) in 2011-2013, was a National Women's History Month 2013 Honoree, and served as president of the American Mathematical Society from 2019-2020. She delivered an invited lecture at the 2014 International Congress of Mathematicians and the 2016 Brown University Presidential Faculty Award lecture. Jill is a fellow of the AMS and SIAM and a member of the American Academy of Arts and Sciences.

Kavita Ramanan is the Roland George Dwight Richardson University Professor of Applied Mathematics at Brown University. She served as deputy director of ICERM in 2020. Kavita works on probability theory, stochastic processes, and their applications. She has made fundamental contributions to the study of reflected processes, large deviations theory, high-dimensional probability, and applications to asymptotic convex geometry. She also has developed novel mathematical frameworks for the analysis of stochastic networks, Markov random fields, and interacting particle systems, which arise as models in a variety of fields ranging from operations research and engineering to statistical physics and neuroscience. Her work combines tools from several fields, including discrete probability, stochastic analysis and partial differential equations. She holds four patents. Kavita is an elected fellow of the AMS, SIAM, and AAAS. She has received honors for her research, such as the Erlang Prize in 2006 by the INFORMS Applied Probability Society for "outstanding contributions to applied probability" and a Medallion from the Institute of Mathematical Sciences in 2015. She was a recipient of a Simons Fellowship in 2018; a Guggenheim Fellowship in 2020; a Distinguished Alumna Award from IIT Bombay in 2020; a Newton Award for Transformational Ideas from the U.S. Department of Defense during the COVID-19 pandemic in 2020; and a Distinguished Research Achievement Award from Brown University in 2021. She was named a member of the American Academy of Arts and Sciences in 2021.

Bjorn Sandstede is Alumni-Alumnae University Professor of Applied Mathematics at Brown University. He studied mathematics at the University of Heidelberg and received his Ph.D. in 1993 from the University of Stuttgart. After holding postdoctoral positions at the Weierstrass Institute in Berlin and Brown, Bjorn was a faculty member at the Ohio State University in 1997-2004 before moving in 2004 to the University of Surrey, England. In 2008, he joined the Division of Applied Mathematics at Brown. Bjorn received an Alfred P. Sloan Research Fellowship in 2000 and was awarded the first J.D. Crawford Prize of the SIAM Activity Group on Dynamical Systems in 2001. Bjorn received a Royal Society Wolfson Research Merit Award and in 2004 the Elsevier Jack Hale Award. Brown awarded him the Philip Bray Award for Teaching Excellence and the Graduate School Faculty Award for Advising and Mentoring. Bjorn is a SIAM Fellow.

Jenna Sousa, Associate Director of Finance and Administration, hired May 2014: reports to the Director. She has more than 15 years' experience in higher education and was in student affairs before coming to ICERM. Jenna oversees program staff and financial staff, providing project management, logistical oversight, and human resources guidance for ICERM's complex portfolio of research programs and events. She directs the long-range and day-to-day financial and administrative activities that support ICERM's mathematical programs and 1,000-plus international scientific researchers annually, including grant proposal submissions, grant management, and reporting. Jenna works closely with the directorate, is involved in management planning sessions for the institute, and serves as the primary financial advisor and administrative risk manager.

Ulrica Wilson is an Associate Professor of Mathematics at Morehouse College. As ICERM's Associate Director, she provides leadership in meeting institutional goals. Ulrica plays a significant role in the development of institute policies and procedures, participation in national meetings and conferences, and partnerships involving government, academia, and the private sector, focusing on ICERM's connections with MSIs, non-R1 institutions, and U.S.-based researchers. Her primary research has been in noncommutative ring theory and combinatorial matrix theory. Throughout her career, she has integrated opportunities to address inequities in the mathematical workforce, including directing the Enhancing Diversity in Graduate Education (EDGE) program and Research Experience for Undergraduate Faculty (REUF) workshops at AIM and ICERM. Ulrica was named a 2019 AWM Fellow for her work supporting the professional development of women pursuing careers in the mathematical sciences.

Facilities

ICERM is located on the 10th and 11th floors of 121 South Main Street, a Brown University-owned building in downtown Providence, RI. Visitors to ICERM are within a 10-minute walk of the Brown campus, train station, major hotels, and a variety of restaurants and historic sites.

ICERM's space includes a 120-seat lecture hall, a 20-seat seminar room, a 20-seat conference room, an administrative suite, office space for 40-45 visitors, two kitchens, and three large collaborative areas.

IT Resources

ICERM's information technology group's mission is to provide the necessary tools for research, collaboration, and information dissemination required by the institute's participants and to support the administrative staff. This is accomplished by providing flexible systems that can be quickly reconfigured to meet research needs and efficient administrative tools that allow the institute's staff to maintain operational excellence. The goal is to provide participants with a wide variety of tools to experiment with and allow them to sample options that may not be otherwise familiar in order to maximize potential avenues for research. ICERM's IT team works with program organizers to tailor technical offerings to support their vision.

Work Stations

ICERM provides virtual desktop systems to all semester program participants using a browser-based noVNC connection to the Center for Computation and Visualization. Most visitors to ICERM bring their own endpoint devices. ICERM supplies monitors, keyboards and mice for each desk. The IT group maintains a small pool of laptops available for participant use on a temporary basis, as well as an array of cables, connectors and adapters.

Applications are distributed based on the needs of the current program and researcher requests. The majority of the applications provided to users will leverage existing Brown license agreements but the IT team supports participant sharing of software developed through our programs.

Web-Based Tools

ICERM provides an evolving suite of web-based tools for collaboration and to assist research. ICERM uses Zoom Meeting to facilitate virtual workshops and the software is available for smaller presentations and participant working groups., who also have access to a dedicated Slack workspace for text-based messaging. ICERM offers participants licensed access to Overleaf, a collaborative web based LaTeX editor. Access to Jupyter notebooks and CoCalc are available upon request.

All talks and papers generated in the course of semester programs are archived and available for download and review via the website.

Multimedia Resources

ICERM has state-of-the-art audio/visual capabilities. The 120-seat lecture hall features dual projection screens, a centrally controlled AV system capable of displaying multiple media types, and a lecture capture system with an auto-tracking camera for recording presentations and streaming to the web. The room is Zoom-capable to facilitate hybrid in-person/remote activities. A smaller meeting room is equipped with a Zoom video conferencing system and includes a

digital media projection system. A seminar room on the 10th floor provides multimedia presentation capability and is also Zoom-capable. ICERM also has an auxiliary portable AV system to make use of large spaces without integrated AV equipment. Digital signage screens throughout the institute are used to display important information to visitors and can be independently used as a peripheral display from a laptop.

Live Streaming

ICERM provides live, real-time video streaming of workshop talks, special events, and tutorial sessions given in the lecture hall.

Video Archives

ICERM digitally records semester and Topical Workshop talks and special lectures in High Definition using the Panopto lecture capture system. Presentations are then archived and made available for viewing on ICERM's website along with a PDF copy of the presenter's slides, when available.

Data Collection and Reporting

ICERM has a visitor management system called Cube to collect and report on participant data. It collects demographic, financial, and scheduling data for all ICERM visitors. External-facing features include ICERM's participant application and organizer information systems. ICERM public calendars, webpages, video archives, and publication listings refer to data held in Cube.

ORCID iD

ICERM collects ORCID iDs from NSF-funded participants, conveying the following message: *In order for the NSF's Division of Mathematical Sciences to effectively evaluate math institutes, it requires that funded participants provide their Open Researcher and Contributor ID (ORCID) identifier. Only those participants who furnish their ID to ICERM may be supported with award funds.*

Brown Computing Resources

ICERM participants are invited to use other IT resources available at Brown. Chief among these is the high-performance computing cluster hosted by the Center for Computation and Visualization (CCV). ICERM provides exploratory access accounts to all long-term participants and to workshop participants on an as-needed basis with approval from the director. Accounts can be upgraded to premium level with access to higher resource limits upon request and with approval from the director.

Participants also are welcome to use the Digital Scholarship Lab at the Rockefeller Library, which incorporates a high-definition video wall for large-scale visualization and collaboration.

CCV makes other services available to ICERM participants, including access to consultants for code creation and optimization and an immersive display environment.

APPENDICES

Appendix A: Fall 2025 Semester Program and Workshop Participant Lists
Appendix B: Spring 2026 Semester Program and Workshop Participant Lists
Appendix C: 2025-2026 Topical Workshops: Participant Lists
Appendix D: Minutes from Board of Trustees Meeting
Appendix E: Minutes from Scientific Advisory Board Meetings
Appendix F: Minutes from Education Advisory Board Meeting
Appendix G: 2025 MIDs Meeting Minutes
Appendix H: Survey Summaries May 1, 2025-April 30, 2026
Appendix I: Publications since last ICERM report
Appendix J: ICERM Participant Data Report (NSF Required)