Freshman Research Immersion (FRI) is a three-course sequence of CUREs (course-based undergraduate research experience) in STEM disciplines which provides first-year students with an authentic research experience. Working alongside faculty and fellow students on cutting-edge research projects, participants tackle weighty world issues, build powerful relationships, and set a course for college and career success.

Currently, FRI has ten research streams with six in life sciences and four additional streams in physical science and engineering disciplines. Each stream has a team of 3-5 faculty sponsors, a research educator, undergraduate peer mentors, and a dedicated laboratory space with research grade equipment.

The first semester research methods course has the following key elements: introduction to process of identifying interesting problems; reading scientific literature to determine what is known and unknown; analyzing data; reporting findings using professional standards of communication; working collaboratively.

In the second semester course, students delve into the research theme of their stream and learn how to use the equipment and protocols of that research stream, such that they write a research proposal and begin a research project.

In the third semester course, students continue their research project and complete the program with a research report and poster.

After FRI, a significant portion of students have continued as FRI undergraduate peer mentors. Also, many of students have continued research with faculty. To date, student teams have presented their research at regional, national, and international conferences and in peer-reviewed publications.
**Sophomore Researchers**

1. Compositional analysis of Green Lake bioherms
   Brittany Brems, Ryan Cohen, Gabrielle Grillo, Sajid Kabir, Jake McCarthy, Zachary Walker

2. Determining the effectiveness of lichens as environmental monitors
   Alex Blumenthal, Sophie Cohen, Matthew Harrison, Raina Searle, William Smisko

3. Hydrochemical analysis and closed system modeling of Glacier Lake for the verification of meromixis
   Elize Chaves, Seth Price, Jenna Ross

4. Oxidation of sulfur, arsenic, and antimony by purple sulfur bacteria
   Gabriel Bongiorno, Andrew Kennedy, Jonathan Tuvy

5. The effects of deicers on denitrification rates
   Margaret Kimmel, Xiaoxin Liang, Anmei Rupnick

**Freshman Researchers**

4:30-5:30pm

6. Determining the environmental conditions of the Gilboa Forest: the earliest example of a forest ecosystem in the fossil record
   Ailish Goering, Charlotte Heo, Morgan Immoor, Sarah MacEntee, Rachel Verdi

7. Effects of excess salt on plant pollution filtration in constructed wetlands
   Jaymin Bhatt, Julia Coffey, Benjamin McDonald, John Mignone, Anesha Morrison

5:30-6:30pm

6. Effects of salinity and pH on microbial respiration of arsenic and antimony in urban wetlands
   Catherine Bibby, Katie Chen, Sofia Fasullo, Jessica Knapp, Tara Lerman, Emily Twerie

7. Whiting events: biological, geological, or both?
   Jack Flanagan, Kathryn Graham, James Hastings, Elizabeth Intskirveli, Grace Laney, Jason Lumerman
**Independent Study Researchers**

9. Glu-glow: creating a fluorescent protein reporter panel of glutamate transporters  
Nina Pregosin  
************************************

10. Monitoring the effects of post-translational modifications on amyloid-beta peptide aggregation  
Joseph Mauro, Tyler Spohr

**Sophomore Researchers**

11. EAAT2 and EAAT3 response to the β-lactam antibiotics: Ceftriaxone and Amoxicillin  
Nicholas Catalano, Christopher Coble, Megan Fey, Nicole Kopetz, Sarah Kromer, Devin Pang, Daniel Powell, Hunter Shaw  
************************************

12. Investigating oxidative stress in the Bcl-2 pathway of A549 cells in the presence of Taxol and Colchicine  
Jessica Barnard, Tashawna Harris, Alyssa Leung, James Oldham, Peter Prisinzano, Caitlin Vitro  
************************************

13. Monitoring lung carcinoma cellular response to artificial sweeteners  
Anna Brennan, Brandon Ngo, Harit Ruengsomboon, Kat Sanders  
************************************

14. Monitoring oxidative stress in the presence of a HDACi chemotherapy drug in A549 cells  
Annalisa Ferrotta, Alejo Gomez, Jaclyn Jew, Emily Loiacono, Hannah Malter, Deepa Mistry, Karen Nganjiyineza  
************************************

15. Optimization of monitoring glutamate transport and investigating the third sodium coordination site in the GLT-1 transporter  
Lamorna Coyle, Charlene Dong, Eden Hirsch, Samuel Santos, Liam Shanley

**Freshman Researchers**

4:30-5:30pm

16. DAPT’s effect on amyloid-beta secretion in Alzheimer’s disease  
Paige Bzdyk, Joseph Hayes, Emily Mohlmann, Arpeet Patel, Alexandra Stone, Jillian Vargas  
************************************

17. JPH203’s effect on LAT1’s leucine uptake in thymic carcinoma and BTC  
Felix Aung, Alexa Avallone, Sara Baldwin, Noah Beck, Angelina Bonacasa, Grace Malley  
************************************

18. miRNA-192 and miRNA-194 expression in cells lines A549 and H1703  
Charlotte Brossof, Zarmina Chaudhry, Daniel DiBua, Quintin Evans, Tiffany Francois, Maya Goldman, Jacob Scarcella  
************************************

5:30-6:30pm

8. Examining the inhibition of mGluR1 in the presence of Riluzole and BAY36-7620 in glioblastomas  
Bryce Heller, Gianna Mochi, Muraad Mughal, Christina Musco, Sonia Nelson, Sharon Yun  
************************************

16. Variants of amyloid beta differentially locate and affect cell viability  
Katie Heit, Bridget Kennedy, Caitlin Lallier, Sarah Mack, Colin Matthews, John McDonald  
************************************
Sophomore Researchers

19. Caffeine and sugar-sweetened beverage consumption and mental health in college students
Nashwan Chowdhury, Catherine Cursio, Lauren Levine, Hannah White

20. Comparison of techniques for estimation of peak height velocity
Jennifer Minassian, Matthew Pelowski

21. Dietary patterns as a factor in rates of growth and maturation in adolescent females
Hebba Ahmad, Katie Carbajal, Jennifer Minassian, Trinh Nguyen, Brionna Palmerino

22. Socioeconomic and musculoskeletal correlates of hormonal contraceptive Use
Dana Al Kuisi, Mahmoud Almady, Jacqueline Pina, Berkley Sawester, Agnes Sydenstricker

23. Variation of body composition and bone properties around peak height velocity
Maia Boni, Michael Carpenter, Fatima Imdad, Laura Koszer, Matthew Pelowski

Freshmen Researchers

4:30-5:30pm

24. Parental socioeconomic indicators and child obesity
Christina Langan, Ryan Noel, Thomas Raleigh, Christopher Rush, Shravani Vanapalli

25. The effectiveness of psilocybin as a treatment for treatment-resistant depression
Gabrielle Blume, Kristen Carrano, Miranda Cesped, Alexandria Colon, Zayn-Al-Din Harper, Aaron Jed, Sonali Malhotra

26. The effects of exercise on the symptoms of post-traumatic stress disorder
Gabrielle Diana, Lauren Fogel, Thomas McKiernan, Lauren Metzdorff, John Pennisi, Claire Rein, Leah Solomon

5:30-6:30pm

17. Plant-based diets as a factor in anxiety and depression
Ripley Hoffman, Devin Link, Alexa Schwartz, Sydney Silverman, Daisy Villalva, Celia Walden

18. Vitamin D and calcium as factors in bone health: an international perspective
Laura Adams, Luke Aghanenu, Leilani Aviles, Elizabeth Bekerman, Chloe Blumberg, Simran Dhanda, William Held
Freshman Researchers

4:30-5:30pm
27. Phenotypic changes over increasing altitude in *Arabidopsis thaliana* along its non-native range
Andrew Curreri, Brian Lubimov, Alexandra Manos, Caitlyn Roig, Abegail Vidrin, Maxine Zaretsky

28. The effect of CO$_2$ and drought on stomatal surface on an endangered endemism
Eric Cheng, Erin Kelly, Melinda Lee, Abigail Long, Kelly Pagniello, Armand Perez

29. Variation in cold tolerance across latitudinal gradient of *Mimulus ringens* (monkey flower)
Isabella Cavallo, Ariel Friedman, Sarah Liebowitz, Diana Riestra, Stacy Safari, Paul Sekas

5:30-6:30pm
24. Adaptation through gene loss in *Arabidopsis thaliana*
Jessica Melita, Elizabeth Oswald, Amanda Pizzo, Alisha Salbert

25. The effects of light pollution on the behavior and development of frogs
Kelsey Horn, Angelika Lyko, Connor Lynch, Elizabeth Pulley, Elizabeth Schwoerer, David Timmerman
Sophomore Researchers

30. A statistical approach to modeling induced seismicity in Oklahoma using multiple linear regression
Nicole Anichich, Marjani Brown, Janine Hvizdos, Gwendolyn Lee, Jialin Li, Miranda Owen

31. Comparison of remote sensing techniques in the search for unmarked buried bodies
Jack Horvath, Joshua Mediavilla, Jessica Moran, Kiara Pena-Augusto, Katrina Weiner, Jacob Wilcox

32. Deploying a UAV-based system to identify methane-emitting oil and gas wells
Judy Li, Ethan Penner, Kevin Reilly, Natalia Romanzo, Samantha Wong

33. Remote sensing and world systems theory at Queen Esthers Site
Jason Russo, Marina Stern, Jillian Vinci, Jennifer Waterman, Linda Zheng

34. Using remote sensing to detect tree distress due to Woolly Adelgid infestation
Stacey Bayer, Victoria Boos, Nefia Chacko, Laquan Garvey, Adin Witt

Freshman Researchers

4:30-5:30pm

35. Detecting Stress in the eastern hemlock by the Woolly Adelgid
Hannah Fishbein, Kathryn Gauthier, Thomas Grosso, Kelly Lebohner, Jeremy Samson, Benjamin Weintrab

36. Predictive modeling of disease-carrying tick density using drone based imagery
Jared Green, Abigail Lilly, Rebecca Marcus, Joseph Murray, Mikayla Scarabelli

37. The use of hyperspectral remote Sensing in the detection, monitoring, and prediction of harmful algal blooms
Hudson Hyams, Keeley Nguyen, Jason Provanzano, Mary Williams, Kelly Young

5:30-6:30pm

28. The detection of unexploded BM-21 Grad 122 mm missiles
Kaylee Cappuccio, Gabriel Chen, Amy Havill, Harry Janoff, Adam Khan, Issac Spiegel

29. Using modern technology to detect and prevent genocide and mass atrocities
Anthony Georgiou, Codyann Henry, Sri Drishaal Kumar, Jakeb Specht, Sydney Trilling, Sophie Whiteman
Sophomore Researchers
38. Extracting and applying gaze data for gaze pattern identification
Jacob Aaronson, Christopher Banvard, Jack Casey, Jake Cope, Miguel Gomez, Andrew Perlowin

39. Holistic identification of scene text with a general image classification CNN
John Curtin, Alison Garrity, Theresa Gundel, Narindra Persaud

40. Sorting recyclable waste to prevent contamination using a convolutional neural network
Kate Baumstein, Paul DeCostanza, Josef Goldberg, Larkin Wisdom

Freshman Researchers
5:30-6:30pm
26. Effect of gaze pattern based stimuli on Alzheimer’s patients
Erin Connolly, Adiel Felsen, Seth Rosenblatt, Reece Pena, Richard Quinlivan, Spiros Rally, Sophie Saremsky

27. Patient-robot interaction through affective analysis using a CNN
Charles Bartoletti, Dominic Dudek, Telly Heidl, Amie Laye, Benjamin Preiser, Joanna Radoslovich

35. Targeted lip reading for security purposes using a CNN
Jack Albertson, Dede Bavon, John DePetro, Naman Garg, Katherine Rollins, Isaiah Farrell

36. The effects of cosmetics on the accuracy of deep learning pixel-based facial-recognition algorithms
Victoria Haimov, Jared Kaufman, Brendan Klayman, Nicholas Pellegrino, Jennifer Thakkar

37. Using convolutional neural networks to detect false emotions
Daniel Iacobacci, Claire Iriarte, Joseph Irish, Brandon Machado, Ryan Ogi, Nathan Shanley
Sophomore Researchers
44. Development of a novel quantification method for cyclic-di-GMP using bis(p-nitrophenyl) phosphate
Kristina Bell, Christopher Farrell, John Fauvell, Brianna Mendelson

45. Development of a novel quantification method for cyclic-di-GMP using cMANT
Talia Cheifetz, Steven Coyle, Golda Eichen, Zachery Goess, Mio Ito

46. Pseudomonas quinolone signal quantification during Pseudomonas aeruginosa biofilm development
Angus Johnson, Avery Lieber, Aysha Malawaraarachchi, Michelle Terry, Chase Tomasino

47. Quantifying outer membrane Vesicles during Pseudomonas aeruginosa biofilm development
Shannon Daino, Kristen Eichele, Lindsay Mendelson, Christopher Ranalli, Matthew Roos, Antonio Torlentino

48. Role of the type VI secretion system on virulence and pathogenesis in biofilm dispersion
Rebecca Aitken, Chun Ting Kao, Kayla Mastropietro, Joseph Migliano, Jake Schweitzer, Nigel Viegas

Freshman Researchers
4:30-5:30pm
41. Biofilm treatment in recreational water systems
Danielle Dattler, Sonia Hills, Nicholas Morales, Sonali Patel, Abigail Gui Radin, Alexander Robins, Ariel Sherry

42. Effectively treating Pseudomonas aeruginosa biofilms in burn wounds
Stephen Baio, Sean Decker, Courtney Fu, Julia Horowitz, Jacob Shepard, Loir Zweig

48. Elimination of biofilms in the food industry: a two-step approach
Allison Cisco, Anthony D’Angio, Sara Evans, Jared Grant, Giselle Jimenez, Ashley Kim

5:30-6:30pm
41. Effects of different treatment methods for biofilms on toothbrushes
Julia Diana, Mark Melnik, Nolan Miller, Jannatul Naima, Nolan Miller, Emily Rail, Ewa Sulicz

42. Oil spill remediation using bacterial biofilms
Caiya DeVerna Schuster, Elijah Gordon, Justin Grunthal, Elizabeth Lai, Nicole Remes, Jordan Thesier
Sophomore Researchers

49. Human mitochondrial genetic diversity in western Iran
Bhavreet Dhandi, Vishnu Nair, Dylan Nicholson, Victoria Sallows, Maria Sosa

50. Origins and dispersal of *Ixodes scapularis*, the tick vector of the Lyme disease in the Southern Tier region: a mitochondrial DNA perspective
Justin Ames, Lindsay Blank, Anthony Germaino, Jessica Kellam, Alivia Ruiz

51. OspC typing of *Borrelia burgdorferi*, the Lyme disease bacteria, in the tick populations of the Southern Tier region
Palmer Ernst, Christine Hurley, Ariel Makower, Neha Shaikh, Julia Tran, Tingyao Wang

52. Population genetics of southern Anatolia according to mitochondrial DNA
Catherine Ayiku Chinock, Amelia Chuisano, Kai Higuchi, Nicole Martini, Alex Montoya, Ethan Spielvogel

53. Prevalence of prion protein gene variants among Kuru affected populations of Papua New Guinea
Nia Brown-Fonrose, Shannon Erickson, Julia Giacinto, Jared Nasso, Dillon Oswald, Anastassia Shifchik

Freshman Researchers

4:30-5:30pm

54. Exploring the associations between clinically-important mitochondrial DNA mutations and haplogroups
Rotem Alon, Ryan Casey, Olivia Charytonowicz, Tia Gross, Humza Khan, Kayla Lieb

55. Impact of global warming on the spread of black legged ticks and Lyme disease in northeastern United States
Brittney Krasnov, Gina Magardino, Thomas Relyea, Erin Urban, Mary Williams, Mike Valarezo

56. Persistence mechanisms of *Borrelia Burgdorferi* and post treatment Lyme disease syndrome
Vanessa Fazzini, Akiva Grimaldi, Abha Japi, Olivia Klingbeil, Jesse Martinez, Allison Wlazlo

5:30-6:30pm

48. The origin and dispersal of the Y-chromosome haplogroup R1b-V88
Osariemen Aiyevbomwan, Riley Balthazor, Megan Egan, Sarah Gnage, Nicole Harrington

54. UV radiation and evolution of human mitochondria
Thomas Grande, Kevin Langbart, Klaire Martinez, Julia Metz, Danielle Napoli, Lauren Picone, Skyler Powers
Sophomore Researchers

57. Analysis of anti-choline acetyltransferase saporin as a viable model for Alzheimer’s disease and its effects on movement
Jason Howard, Katelyn Lerner, Ryan McGuire, John Russo, Lea Safarpour, Alice Zhang

58. Analysis of neurotransmitter preservation through heat inactivation of enzymes
Rosemary Cannarella, Cristal Finkenberg, Zachary Herz, Madison Kleppan-Mella, Benjamin Morrison, Jessica Smith

59. Effects of anti ChAT saporin lesions on spatial memory and ACh levels in the hippocampus
Aissata Diallo, Jovannah Gerisma, Jacob Harron

60. Effects of isoflurane on monoamines in the corpus striatum of male and female rats
Simra Aziz, Linie Li, Lauren Misata, Hannah Rockwood

61. Effects of varying isoflurane anesthesia levels on serotonin and dopamine levels in the rat motor circuit
Allison Goetz, Joseph Lepore, Lily Rundquist, Caiti-Erin Talty, Sihan Zeng

62. The effect of sodium pentobarbital and isoflurane on acetylcholine concentration in the pedunculopontine tegmental nucleus, striatum, and substantia nigra
Mia Cruceta, Carolyn Fon, Elizabeth Kilpatrick, Andrea Liss, Noelle Marcotullio

Freshman Researchers

4:30-5:30pm

63. Comparison of rat behaviors that model Obsessive-Compulsive Disorder
Erika Hryhorenko, Julia Mende, Abigail Reilly, Gina Rizzo, Sydney Tse, Sophia Valerino, Hannah Wojcik

64. Evaluation of targets for deep brain stimulation in a rat model of Obsessive-Compulsive Disorder (OCD)
Kristen Coletti, Juan Mato, Benjamin Moses, Rebecca Nussbaum, Dana Silberstein, Maylin Vititow

5:30-6:30pm

55. Effect of hormonal cycles on obsessive compulsive behaviors in a rat model
Hana Makota, Lenah Midani, Samantha Paley, Allison Radin, Eliana Safer, Emily Walters

56. Manipulation of the subthalamic nucleus to reduce Obsessive Compulsive Disorder in a rat model: deep brain stimulation versus localized drug injection
Randy Abramovich, Randy De La Cruz, Nicole Gill, Olivia Lawrence, Alyssa Quaglia, Juliana Viola

63. Use of a rat model to investigate ketamine as an alternative pharmacological treatment of Obsessive Compulsive Disorder
Emily Bellow, Brooke Bokal, Miya Carmichael, Kayla Elder, Jessica Krupa, Danielle Stern
Freshman Researchers

4:30-5:30pm
65. Carbon quantum dots as environmental sensors of paraoxon
   Davis Gee, Carrie Hathaway, Ivy Li, Deiniol McGovern, Zachary Szigeti, Samin Zaman
   *****************************************************

66. Comparing synthetic methods of quantum dot fabrication for reducing environmental impact
   Adam Burbank, Kristine Denimarck, Ian Joel Fernandez, Kevin Phillips, Lorenzo Schellack, Ryan Schieber
   *****************************************************

5:30-6:30pm
64. Comparing power conversion efficiencies of cadmium-based quantum dots in thin film solar cells
   Trevor Cronin, Joel Faynshmidt, Jonathan Pasternak, Alex Santana, Justin Snyder
   *****************************************************

65. Effects of doping on the efficiency of methylammonium lead halide perovskite solar cells
   Daniel Coladangelo, Brian He, Anthony Pacileo, Aidan Sisk, Jeremy Wells, Oscar Young
   *****************************************************

66. Improving stability and efficiency of perovskite solar cells through layering
   Ryan Board, Jamie Coghlan, Madeline Harp, Thomas Houghton, Christina Jacob, Brandon Liu
   *****************************************************
Funding for Freshman Research Immersion provided by:
FRI Poster Location Map

*Poster locations for each team can be found at the beginning of each poster title in the program*
FRI Program Staff

Megan Fegley
Program Director

Nancy Stamp
Founding Program Director

Michelle Withers
STEM Educator

Anita Cipolla
Office Assistant

fri@binghamton.edu

FRESHMAN RESEARCH IMMERSION PROGRAM

Walk in a freshman — Walk out a researcher.