



10th Annual

FALL FRONTIERS

UNDERGRADUATE RESEARCH POSTER EXHIBITION

October 19, 2022

5:00 - 7:00 p.m.

Wilbur Cross North Reading Room

**Sponsored by the
University of Connecticut**

Office of Undergraduate Research
Enrichment Programs



About Frontiers in Undergraduate Research

The Fall Frontiers Poster Exhibition is a multidisciplinary research forum showcasing undergraduate research, scholarship, and creative projects at the University of Connecticut. Fall Frontiers complements the longstanding spring Frontiers exhibition, providing an additional opportunity for UConn's student researchers to share their exciting work.

This is the tenth fall event sponsored by the Office of Undergraduate Research (OUR). This year's exhibition includes 87 students presenting posters for 77 research and creative projects at the in-person exhibition. Additional projects can be viewed in the online exhibition at ugradresearch.uconn.edu/fallfrontiers2022

Students' projects span the disciplines and include both independent research and work pursued in collaboration with other undergraduates. The projects presented reflect the invaluable contributions of research mentors, including graduate students, postdoctoral scholars, staff, and faculty members. We hope you enjoy meeting our wonderful students and learning about their innovative projects.

About the Office of Undergraduate Research

The Office of Undergraduate Research is a resource for students interested in enriching their undergraduate experience through participation in research, scholarship, and creative activity. The OUR provides information and advising to assist students in identifying relevant opportunities, as well as several funding programs to support the students and their faculty mentors.

Many of the Fall Frontiers presenters have received financial support for their projects from the OUR, which awarded over \$560,000 in 2021-22 in support of students' research and creative endeavors. These awards are funded by the Office of Undergraduate Research with generous support from the Office of the Provost, the Office of the Vice President for Research, the deans of the schools and colleges, and private donations from alumni, parents, and other friends of UConn and undergraduate research.

10th Annual Fall Frontiers Poster Exhibition

Poster Exhibition

Wednesday, October 19, 2022

5:00 p.m. – 7:00 p.m.

Speaking Program

5:30 p.m.

Welcome and Introductions

Caroline McGuire

Executive Director, Enrichment Programs, and
Director, Office of Undergraduate Research

Keynote Speaker

Amy Gorin

Interim Vice Provost for Health Sciences &
Professor, Psychological Sciences

Closing Remarks

Jennifer Lease Butts

Associate Vice Provost, Enrichment Programs, and
Director, Honors Program

Sequential Listing of Poster Presentations

This listing of projects includes the undergraduate student authors and their faculty mentors. Please note that this is not a comprehensive listing of mentors: many projects also reflect the contributions and mentorship of dedicated graduate students, post-doctoral scholars, and research staff members. An alphabetical listing of presenters is included at the end of the program.

1. Promoting Positive Mental Well-Being Among Adolescent Girls of Color Through Engagement in Animal Care Training

Jasmine Morris, Animal Science & Applied and Resource Economics

Advisor: Tamika La Salle, Associate Professor, Educational Psychology

2. Navigating William Tyndale's *Obedience of a Christen Man* as a Part of "The Tyndale Project"

Madison Bigelow, English

Joanne Biju, English & Political Science

Advisor: Clare Costley King'oo, Associate Professor, English

Advisor: Susan Felch, Professor, English, Calvin University

3. Accumulating Evidence About STEM Educational Experiences

Rhea Koyambreth, Physiology and Neurobiology & Psychological Sciences

Advisor: Kathleen Lynch, Assistant Professor, Educational Psychology

4. Fostering Effective and Inclusive Group Work in Studio Style Physics Courses

Mona Peyravi, Allied Health Sciences

Advisor: Erin Scanlon, Assistant Professor in Residence, Physics

Advisor: Matthew Guthrie, Assistant Professor in Residence, Physics

Advisor: Xian Wu, Associate Professor in Residence, Physics

5. Counterfactual Conditionals, Possibility, and Impossibility

Cindy Pan, Philosophy & Molecular and Cell Biology

Advisor: Keith Simmons, Professor, Philosophy

6. Truth and the Liar Paradox

Jeremy Bachman, Philosophy

Advisor: Keith Simmons, Professor, Philosophy

7. Police Killings of Native American People: Examining Variation Across Space, Time, and Status Characteristics

Samantha Gove, Sociology & Human Rights

Advisor: Ryan Talbert, Assistant Professor, Sociology

8. Modern Racism: How Patriot Front Utilizes Internet Presence To Recruit Members Nationwide

Kyle Makalusky, Psychological Sciences & Sociology

Advisor: Ryan Talbert, Assistant Professor, Sociology

9. Local Confederate Iconography and Gender-Ethnic Variation in Mental Health Among Black Residents

Jasmine Aboumahboob, Individualized Major: Human Physiology and Sociomedical Sciences

Advisor: Ryan Talbert, Assistant Professor, Sociology

10. Incarceration and the Self-Concept

Brianna Monte, Nursing & Sociology

Advisor: Ryan Talbert, Assistant Professor, Sociology

11. Incarceration and Mental Health Among Cuban, Mexican, and Puerto Rican Adults in the U.S.

Jade Rivera, Pharmacy

Advisor: Ryan Talbert, Assistant Professor, Sociology

12. Exploring Food Insecurity in Greater Hartford Using a Structured Survey

Thomas Bonitz, Geographic Information Science & Economics

Advisor: Peter Chen, Assistant Professor, Geography

13. Grocery Shopping Near and Far: How Being Food Insecure and Living in a Food Desert Can Impact Shopping Habits

Lucie Lopez, Psychological Sciences & Spanish

Xuan (Debbie) Xiao, Geographic Information Science

Advisor: Peter Chen, Assistant Professor, Geography

14. Double Up Food Bucks: Locations and Demographics

Christina Clouser, Political Science

Nick Hamel-Porter, Economics

Advisor: Cristina Connolly, Assistant Professor, Agricultural and Resource Economics

15. Elucidating the Malaysian Chemsex Experience: What Are the Personal Histories, Practices, and Needs of Malaysian MSM?

Christopher Uyar, Allied Health Sciences

Advisor: Roman Shrestha, Assistant Professor, Allied Health Sciences

16. Addressing the Mental Health Crisis: An Evaluation of Mental Health Policy in Connecticut and Disparities in Mental Health Care For Black Adolescents Post-COVID-19

Kiara Ballij, Political Science & Economics

Advisor: Jennifer Sterling-Folker, Professor, Political Science

17. Mental Health Through COVID-19: Psychosocial Insights from the Pandemic Journaling Project

Joshua Ellenberg, Anthropology & German

Yana Tartakovskiy, Healthcare Management

Advisor: Sarah Willen, Associate Professor, Anthropology

Advisor: Katherine Mason, Associate Professor, Anthropology, Brown University

18. Presidential Approval at the State Level

Madeline Doyle, Political Science

Advisor: Matthew Singer, Professor, Political Science

19. Understanding the Associations Between Social and Emotional Expression, Communication, and Relationships in Individuals with Eating Pathology

Alyssa Daniels, Physiology and Neurobiology

Advisor: Amy Gorin, Interim Vice Provost for Health Sciences & Professor, Psychological Sciences

20. Mayoral Approval in Latin America

Emma Harvison, Political Science & Human Rights

Advisor: Matthew Singer, Professor, Political Science

21. Digital Health as a Means and Measure of Health Equity: Practical Strategies to Address Health Disparities in Connecticut

Sharanya Chandu, Physiology and Neurobiology & Healthcare Management

Advisor: Jane Im, Assistant Professor, Pediatrics

Advisor: Richelle deMayo, Assistant Professor, Pediatrics, Connecticut Children's Medical Center

22. Latino Voting Turnout in US Presidential Elections

Kayleigh Collins, Political Science

Mariam Vargas, Political Science

Advisor: Beth Ginsberg, Assistant Professor in Residence, Political Science

23. Racial and Geographic Diversity and Team Productivity: Evidence from the American Whaling Industry

Nidhi Nair, Economics & Mathematics-Statistics

Advisor: Metin Cosgel, Professor, Economics

24. Examining Public Hearings: An Assessment of Public Participation and Its Limitations in State Legislatures Across the U.S.

Alesia Ballij, Political Science & Economics

Advisor: Jennifer Sterling-Folker, Professor, Political Science

25. The Road to Nowhere: Assessing Governmental Regulations on Coal-Tar Pavement Products

Lauren Baskin, Political Science & English

Advisor: Kimberly Bergendahl, Associate Professor in Residence, Political Science

26. Adolescent/Young Adult Sleep Trends Over the Past Decade

Allison Nemesure, Physiology and Neurobiology

Advisor: Sharon Smith, Professor, Pediatrics, Connecticut Children's Medical Center

27. Changes in Health, Work, and Non-Work Factors During COVID-19 Among Hourly and Salaried Manufacturing Workers

Delia Lin, Molecular and Cell Biology & Statistics

Advisor: Jennifer Garza, Assistant Professor, Medicine

28. How to Reason in Nepali

Kavya Krishnan, Cognitive Science

Advisor: Magdalena Kaufmann, Associate Professor, Linguistics

29. Bilingualism: Is There a Structural Advantage?

Alyssa Sirisoukh, Molecular and Cell Biology

Advisor: Nicole Landi, Associate Professor, Psychological Sciences

30. Learning Words in a Malevolent World: Partial World Learning From Low Informative Input

Julie-Ann Williams, Cognitive Science

Advisor: Sumarga Suanda, Assistant Professor, Psychological Sciences

31. The Use of Speech, Facial Expressions, and Gestures as a Primary Method of Communication in Adults with Autism Spectrum Disorder

Marissa Birmingham, Cognitive Science

Advisor: Inge-Marie Eigsti, Professor, Psychological Sciences

32. Myo-Inositol Transport in RTN Chemosensitive Neurons

Nicholas Munteanu, Physiology and Neurobiology

Advisor: Daniel Mulkey, Professor, Physiology and Neurobiology

33. Electron Microscopy of Astrocyte-Contacting Synapses for Inputs from Infralimbic Cortex to the Lateral Amygdala

Mumu Fang, Physiology and Neurobiology & Psychological Sciences

Advisor: Linnaea Ostroff, Assistant Professor, Physiology and Neurobiology

34. Effects of the Xlr-3b Gene on Behavior Using a Mouse Model

Karen Alex, Physiology and Neurobiology

Advisor: Roslyn Fitch, Professor, Psychological Sciences

35. Control of Neuronal Migration in the Medial and Rostral Migratory Streams Guided By Eph/Ephrin Protein Expression Patterns

Sarah Bellizzi, Physiology and Neurobiology

Advisor: Joanne Conover, Professor, Physiology and Neurobiology

36. Investigating the Expression of Presynaptic Proteins in Hypothalamic Arousal Neurons

Sara Bernardo, Biological Sciences

Advisor: Alexander Jackson, Associate Professor, Physiology and Neurobiology

37. Investigating the Disassembly of Cytoplasmic F-Actin-Rich Territories During Intrinsic Apoptosis

Taylor Domingue, Molecular and Cell Biology

Advisor: Kenneth Campellone, Associate Professor, Molecular and Cell Biology

38. Understanding the Relationship Between B chromosomes and Nondisjunction in *Drosophila melanogaster*

Ayushi Patel, Molecular and Cell Biology

Advisor: Stacey Hanlon, Assistant Professor, Molecular and Cell Biology

39. Understanding the Role of Fumarase in DNA Damage Response

Juan Colberg-Martinez, Molecular and Cell Biology

Advisor: Ann Kirchmaier, Associate Professor, Biochemistry, Purdue University

40. Expression of Genes in the Colon Through Comprehensive RNA-Sequencing

Lauren Chance, Molecular and Cell Biology & Mathematics-Statistics

Advisor: Marmar Moussa, Assistant Professor, Medicine

41. CRISPR Gene Editing to Test the Function of DNA Mismatch Repair in Cancer-Associated Variants

Patrick Pagano, Pathobiology

Advisor: Christopher Heinen, Professor, Medicine

Advisor: Paulo Verardi, Associate Professor, Pathobiology and Veterinary Science

42. Calponin 2 Modifies Hmgcs2-Mediated Ketogenesis to Regulate Kidney Injury in AKI

Zachary Palanza, Molecular and Cell Biology

Advisor: Dong Zhou, Assistant Professor, Medicine

43. The Relationship of Novel Human Genes to 3D Genome Organization and Function

Nitanta Garag, Biomedical Engineering

Advisor: Jelena Erceg, Assistant Professor, Molecular and Cell Biology

44. Genetically Engineering the CotA Laccase Gene of *Bacillus subtilis* In Order to Degrade 17 α -ethynylestradiol

Srilekha Kadimi, Biomedical Engineering

Rebecca Abirached, Allied Health Sciences

Phoebe Johnston, Biological Sciences

Advisor: Rachel O'Neill, Professor, Molecular and Cell Biology

Advisor: Lisa Nigro, Assistant Research Professor, Institute for Systems Genomics

45. Crucial Role of LSD1 in Cisplatin Induced Kidney Damage

Liz Carrizzo, Biomedical Engineering

Advisor: Yanlin Wang, Professor, Medicine

46. SCARF-1 Dysregulation Leads to the Development of Lupus

Kasidy Quiles, Allied Health Sciences

Advisor: Zaida Ramirez-Ortiz, Assistant Professor, Medicine, UMass Chan Medical School

47. Investigating the Role of PARG in PARP Inhibitor Resistance

Julia Purcell, Molecular and Cell Biology

Advisor: Ranjit Bindra, Professor, Pathology & Therapeutic Radiology, Yale University

48. Role of bosR in Transmission of Lyme Diseases

Om Sinojia, Biological Sciences

Advisor: Melissa Caimano, Associate Professor, Medicine

49. Role of CD13 in Macrophage Giant Cell Fusion

Fraser McGurk, Molecular and Cell Biology

Advisor: Mallika Ghosh, Assistant Professor, Cell Biology

50. Synthesis of Novel Near-Infrared Voltage Sensitive Dyes

Giuliana Judge, Chemistry

Advisor: Ping Yan, Assistant Professor, Center for Cell Analysis and Modeling

51. Organic Synthesis: Constructing Tools for Understanding Human Biology

Robert Gilbert, Chemistry

Advisor: Amy Howell, Professor, Chemistry

52. Automating On-Resin Derivatization of Peptides for Single-Sequence Identification

Connor Jewell, Chemistry

Advisor: Xudong Yao, Associate Professor, Chemistry

53. Evolving Intrinsically Disordered Peptides (IDP) for Biosensor Development

Aiden Reilly, Biomedical Engineering

Advisor: Yi Wu, Associate Professor, Genetics and Genome Sciences & Center for Cell Analysis and Modeling

54. Oxidation of Alcohols Using Mesoporous CsMnOx and MnOx Catalyst

Ange Vil, Chemistry

Advisor: Steven Suib, Distinguished Professor, Chemistry

55. Development of a Novel Tension Sensor Using the Binder/tag Method and Single-Molecule Imaging

Amy Flis, Structural Biology and Biophysics & Molecular and Cell Biology

Advisor: Yi Wu, Associate Professor, Genetics and Genome Sciences & Center for Cell Analysis and Modeling

56. Withdrawal- and Anxiety-Like Behaviors Following Oral and Systemic Oxycodone Administration in C57BL6 Mice

Caryssa Drinkuth, Molecular and Cell Biology

Advisor: Gregory Sartor, Assistant Professor, Pharmaceutical Sciences

57. Impact of Heat and Humidity on Aspirin Tablets' Physical Stability

Lyla White, Pharmacy Studies

Advisor: Bodhi Chaudhuri, Professor, Pharmaceutical Sciences

Advisor: C. Michael White, Distinguished Professor, Pharmacy Practice

58. Developing a Physiologically Inspired Model of Human Speech Recognition In Noise

Alex Clonan, Electrical Engineering & Molecular and Cell Biology

Advisor: Monty Escabi, Professor, Electrical and Computer Engineering

59. SaaS Tool for Patent Searching

Massyl Mallem, Chemical Engineering

Jake Winter, Mechanical Engineering

Arav Parikh, Computer Science and Engineering

Brian Hance, Computer Science and Engineering

Advisor: Shiri Dori-Hacohen, Assistant Professor, Computer Science and Engineering

60. Characterization of Titanium Nitride Thin Films by Reactive Sputtering

Derek Lefcort, Electrical Engineering

Advisor: Helena Silva, Professor, Electrical And Computer Engineering

61. A Remodeling-Based Approach for Osteochondral Allograft Integrative Repair

Arsalan Zaki, Physiology and Neurobiology

Advisor: Caroline Dealy, Associate Professor, Craniofacial Sciences, Biomedical Engineering, Orthopedic Surgery & Cell Biology

Advisor: Melanie Fisher, Research Associate, Cell Biology

62. Cross-Talk Between EGFR and BMP Signals Regulates Chondrocyte Maturation During Endochondral Ossification

Krithika Santhanam, Allied Health Sciences

Advisor: Caroline Dealy, Associate Professor, Craniofacial Sciences, Biomedical Engineering, Orthopedic Surgery & Cell Biology

63. The Effects of Acidic Challenge on Bone in Ex Vivo Models

Sydney Whittaker, Biological Sciences

Advisor: Alix Deymier, Assistant Professor, Biomedical Engineering

64. Characterization of Lgr6 in Osteogenic Tissue

Nicole Calder, Molecular and Cell Biology

Advisor: Archana Sanjay, Associate Professor, Orthopaedic Surgery

65. The Development of a Voluntary Head Restraint System for Attentional Set Shifting Tasks

Mark Cristino, Biomedical Engineering

Advisor: Timothy Spellman, Assistant Professor, Neuroscience

66. Automation Software to Minimize Human Errors While Interacting with Complex Computer Graphical User Interfaces in Research Settings

Anastasiia Drozdova, Computer Science and Engineering & Chemistry

Advisor: Manuel Castro-Alamancos, Professor, Neuroscience

67. Analysis of Black Hole Accretion and Feedback in the SIMBA Cosmological Simulations

Sofya Levitina, Physics & Mathematics-Statistics

Advisor: Daniel Angles-Alcazar, Assistant Professor, Physics

68. Direct Measurements of Electron Density, Temperature, and Chemical Abundance of HII Regions in NGC 4254

Eric Habjan, Physics

Advisor: Christopher Faesi, Assistant Professor, Physics

69. Measuring Galactic Acceleration with Pulsar Timing

Abigail Moran, Physics & Applied Mathematics

Advisor: Chiara Mingarelli, Assistant Professor, Physics

70. Excess Commuting Burden

Sophia Fenn, Civil Engineering & Spanish

Advisor: Davis Chacon Hurtado, Assistant Research Professor, Civil and Environmental Engineering & Human Rights Institute

71. Preparing for Larval Experiments: Should Scientists Report Details About the Egg Life-Stage?

Abigail Bernstein, Environmental Sciences

Advisor: Tracy Rittenhouse, Associate Professor, Natural Resources and the Environment

72. Does Model Wetland Complexity Influence Experimental Rhanavirus Epidemics?

Jenna Bartholomew, Natural Resources

Advisor: Tracy Rittenhouse, Associate Professor, Natural Resources and the Environment

73. Genome Assembly of the Endangered Pumpkin Ash (*Fraxinus profunda*) to Aid Conservation Efforts Across Ash Species

Emily Strickland, Molecular and Cell Biology & Nutritional Sciences

Advisor: Jill Wegrzyn, Associate Professor, Ecology and Evolutionary Biology

74. Assembling the Genome of Ice Cream Bean: The First Reference for the Tropical Legume, *Inga vera*

Harshita Akella, Molecular and Cell Biology

Advisor: Jill Wegrzyn, Associate Professor, Ecology and Evolutionary Biology

75. The Evolvability of Extremophiles: Can Haloarchaea Mate in High-Stress Environments?

Emma Triantafyllou, Pathobiology

Advisor: Mark Urban, Professor, Ecology and Evolutionary Biology

76. Effects of Maternal Nutrition on Muscle Cross Sectional Area and Lipid Content

Shawn Re, Animal Science

Advisor: Kristen Govoni, Professor, Animal Science

77. A Health Service Without a Country: The History of Healthcare for Refugees and Displaced Persons After World War II

Nour Al Zouabi, Individualized Major: Rights, Health and Refugees & Molecular and Cell Biology

Advisor: Sara Silverstein, Assistant Professor, History & Human Rights Institute

Alphabetical Listing of Presenters with Poster Numbers

Abirached, Rebecca – 44	Gove, Samantha – 7
Aboumahboob, Jasmine – 9	Habjan, Eric – 68
Akella, Harshita – 74	Hamel-Porter, Nick – 14
Al Zouabi, Nour – 77	Hance, Brian – 59
Alex, Karen – 34	Harvison, Emma – 20
Bachman, Jeremy – 6	Jewell, Connor – 52
Ballij, Alesia – 24	Johnston, Phoebe – 44
Ballij, Kiara – 16	Judge, Giuliana – 50
Bartholomew, Jenna – 72	Kadimi, Srilekha – 44
Baskin, Lauren – 25	Koyambreth, Rhea – 3
Bellizzi, Sarah – 35	Krishnan, Kavya – 28
Bernardo, Sara – 36	Lefcort, Derek – 60
Bernstein, Abigail – 71	Levitina, Sofya – 67
Bigelow, Madison – 2	Lin, Delia – 27
Biju, Joanne – 2	Lopez, Lucie – 13
Birmingham, Marissa – 31	Makalusky, Kyle – 8
Bonitz, Thomas – 12	Mallem, Massyl – 59
Calder, Nicole – 64	McGurk, Fraser – 49
Carrizzo, Liz – 45	Monte, Brianna – 10
Chance, Lauren – 40	Moran, Abigail – 69
Chandu, Sharanya – 21	Morris, Jasmine – 1
Clonan, Alex – 58	Munteanu, Nicholas – 32
Clouser, Christina – 14	Nair, Nidhi – 23
Colberg-Martinez, Juan – 39	Nemesure, Allison – 26
Collins, Kayleigh – 22	Pagano, Patrick – 41
Cristino, Mark – 65	Palanza, Zachary – 42
Daniels, Alyssa – 19	Pan, Cindy – 5
Domingue, Taylor – 37	Parikh, Arav – 59
Doyle, Madeline – 18	Patel, Ayushi – 38
Drinkuth, Caryssa – 56	Peyravi, Mona – 4
Drozdova, Anastasiia – 66	Purcell, Julia – 47
Ellenberg, Joshua – 17	Quiles, Kasidy – 46
Fang, Mumu – 33	Re, Shawn – 76
Fenn, Sophia – 70	Reilly, Aiden – 53
Flis, Amy – 55	Rivera, Jade – 11
Garag, Nitanta – 43	Santhanam, Krithika – 62
Gilbert, Robert – 51	Sinojia, Om – 48

Sirisoukh, Alyssa – 29
Strickland, Emily – 73
Tartakovskiy, Yana – 17
Triantafyllou, Emma – 75
Uyar, Christopher – 15
Vargas, Mariam – 22
Vil, Ange – 54

White, Lyla – 57
Whittaker, Sydney – 63
Williams, Julie-Ann – 30
Winter, Jake – 59
Xiao, Xuan (Debbie) – 13
Zaki, Arsalan – 61

Special Thanks

The Office of Undergraduate Research wishes to thank the deans of the represented schools and colleges, the Office of the Provost, the Office of the Vice President for Research, and the generous donors to Enrichment Programs and to the Honors Program for their support of undergraduate research.

We thank the student volunteers for the Fall Frontiers Poster Exhibition, without whom this event would not be possible.

In addition, we thank the following individuals for their support:

Radenka Maric, *President, University of Connecticut*

Anne D'Alleva, *Interim Provost and Executive Vice President for Academic Affairs*

Michael Bradford, *Vice Provost for Faculty, Staff, and Student Development*

Jennifer Lease Butts, *Associate Vice Provost, Enrichment Programs and Director, Honors Program*

Office of Undergraduate Research

Staff

Caroline McGuire, *Executive Director, Enrichment Programs and Director, Office of Undergraduate Research*

Melissa Berkey, *Assistant Director*

Liza Boritz, *BOLD Program Director and Advisor*

Jodi Eskin, *Program Administrator and Advisor*

Rowena Grainger, *Assistant Director for Research and Fellowship Programs, Enrichment Programs*

Peer Research Ambassadors

Michelle Antony '23 (CLAS)

Anabelle Bergstrom '25 (CLAS)

Erik Choi '23 (CLAS)

Alex Clonan '22 (ENG & CLAS)

Kira Cuneo '23 (ENG)

Alyssa Daniels '23 (CLAS)

Alexandra Goldhamer '23 (CLAS)

Paul Isaac '23 (CLAS & CAHNR)

Jerome Jacobs '23 (CAHNR)

Ayushi Patel '23 (CLAS)

Stephanie Schofield '23 (CLAS)

Elisa Shaholli '23 (CLAS)



UConn

ENRICHMENT PROGRAMS

OFFICE OF
UNDERGRADUATE RESEARCH