Western tradition credits Plato with establishing the Academy in Ancient Greece for the purpose of research. Although application varies by discipline, the essential elements of research include the discovery of human perspectives, systematic inquiry at the boundaries of human experience, and creation of products that expand human knowledge.

Discovery, inquiry and creativity are evident in the 143 presentations composing the 2019 Student Undergraduate Research Festival (SURF) at Carroll College. Students have discovered and studied the perspectives of scholars with shared interests. They have applied the tools and skills unique to their discipline to make inquiries beyond our current understanding. By participating in this festival, they will share an original creative product meant to expand our knowledge. We celebrate their achievements and hope to stimulate future scholars to participate in the never-ending research tradition.

Congratulations to the student participants. Your efforts have earned you the title of scholar. Thank you to the faculty mentors. Apprenticeship learning is a labor-intensive endeavor that extends the student experience beyond the discovery phase into the realm of authentic scholarship.

Thank you to the members of the SURF committee (Dr. Eric Sullivan, Dr. Ryan Hallows, Dr. Jeanette Fregulia, and Dr. Brandon Sheafor) for your academic oversight of this event. Thank you to Ms. Maria Larson who provided expertise in logistics, programming and promotion and for coordinating SURF as part of the 2019 inauguration of Dr. John Cech as the 18th President of Carroll College.

DR. GRANT HOKIT, Senior Research Associate
Session 1 Posters 9–10 a.m.  UPPERCAMPUS CENTER

Heidi Hohmann
Health Sciences
The Effect of the Human Papillomavirus Vaccine on Fertility Rates in Adolescent and Young Adult Aged Men and Women: A Systematic Review

Mackenzie Hansen
Health Sciences & Anthrozoology
Effect of Canine Assisted Therapy on Emotionally Stressed Undergraduate College Students: A Systematic Review

Esmeralda Campos
Psychology
Are Racial Minority Students Experiencing Microaggressions at Carroll College?

Connor Hague
Honors Scholars Program
Psychoanalyzing the Conversion of St. Augustine

Luke McEntee and Logan Meeks
Molecular Biology
The Effectiveness of Turmeric on Relieving Oxidative Stress in Tetrahymena thermophila

Talya Vaira
Biological Chemistry
Got Phthalates? Analysis of Plasticizers in Popular Consumer Products

Talya Vaira and Peyton Twete
Molecular Biology
Effect of bis (2-ethylhexyl) phthalate on Tetrahymena thermophila DCL-1 Gene Expression and Conjugation

John Cooney
Honors Scholars Program
Ethics and Being: A Comparison of Thomistic and Nietzschean Metaphysics and Ethics

Samantha Trudeau
Health Sciences
Governmental Legitimacy: Power, Authority, and Violence in Arendt and Machiavelli

Shirley Davidson, Sabrina Crooks and Terry Cox
Mathematics
Math Modeling Contest: Optimized Plan to Leave the Louvre

Paul Wilson
Chemistry
Analysis of Carbene Intermediates from Thiophene Ylides

Joseph Pesa
Chemistry
Forming Carbon-Carbon Bonds Via Photo-oxidation

Alexander Hoffman, Keaton Brady, Samantha Mundel and Taryn Stewart
Physical Chemistry
Site Specific Photoinitiated Release of Bromothymol Blue

Emma Nylin, Keely Mills, Joshua Plafcan and Hailey Vietz
Psychology
Effect of Mild Stress on Memory Retention

Carleigh Thurman
Health Sciences and Anthrozoology
The Effect of Equine Assisted Therapy on Social Function in Children with Autism

Megan Ryan
Health Sciences
The Effects of High Maternal BMI on the Risk of Childhood ADHD

Roma Seal and Isabella Maag
Cell & Molecular Neuroscience
Effects of E-Cigarette Vapor on Delta7 Gene Expression and Motor Function in Adult Drosophila melanogaster

Jacob Meek and Megan Bousliman
Cell and Molecular Neuroscience
Effect of High Fat/High Sugar Diets on Fruitless gene Expression and Copulatory Behavior in Drosophila melanogaster

Vanessa Rodriguez and Michael Larsen
Cell and Molecular Neuroscience
Effects of Lead Exposure in Drosophila melanogaster and the expression of the Neur gene

Kaitlin Stromberg
Biology
Microsatellite analysis of Culex tarsalis Populations in Montana

Keven Kailey
Health sciences
Physical Effects In Female College Athletes with Eating Disorders

Sofia Minudri
Honors Scholars Program
The Value of What We Owe God

Morgan Shimkus, Sean Cleary and Jillian Hendrix
Environmental Science
Landcape History and Potential Mining Impacts Recorded in Lake Helena Sediments

Gwen Cooper and Alex Steinmetz
Cell and Molecular Neuroscience
The Effect of Nicotine on the Spitz Gene in Drosophila melanogaster

Tristan Rhodes, Alex Fries and Josie Smith
Nursing
Is There a Connection Between Insomnia and the Development of Alzheimer’s Disease?

Lily Willig
Honors Scholars Program
Exploring the Development of Moral Value Using Sigmund Freud and Shakespeare’s King Lear

Jake Plagenz
Biochemistry
Bioinformatic Analysis of The Flathead Lake Monster Bacteriophage

Sydney Harris and Mary Hall
Gender Studies
Modern Homonegativity at a Private Catholic College: A Comparison of Prejudice Toward Gay Men and Lesbian Women

Caitlin Troyer
Political Science
Partisanship & Representation in Montana’s 2018 Midterm Election

Dylan Jones, Nolan Hofstee and Alex Skoulis
Cell and Molecular Neuroscience
Effect of Ethanol Withdrawal on Dunce Gene Expression and Learning in Drosophila melanogaster

Benjamin McFarland and Christopher Genin
Cell and Molecular Neuroscience
Effect of Ethanol on the Hangover Gene and Synaptic Growth in Drosophila melanogaster

Siobhan O’Neill
Neurobiology
Pesticides and Parkinson’s Disease: An Investigation of the Effect of Roundup Exposure on Drosophila melanogaster

Amanda Skaffestad
Public Health
Adverse Childhood Experiences (ACEs) and Alcohol Use in Native American Young Adults: A Systematic Review

Haley Meredith
Chemistry
Electrochemically- and Photochemically-Induced Dimerization of 2-methylthiophene

Gordon Graham
Honors Scholars Program
The Veil of Equality

Brianna Bivens, Lily Feeback and Joshua Stokman
Water Quality
Solving the Water Mystery: Unionville Reconnaissance Groundwater Analysis

Jocelyn Sigl and Marissa Baer
Nursing
Breastfeeding success in the cup-fed premature infant

Audrey Yaeger
Biochemistry
Quantifying the Temperature Dependent Rate of Solventless Redox Reactions

Josephine D’Agostino and Madeline Winter
Postpartum Hemorrhage
Prevent Postpartum Hemorrhage

Henry Walker and Ethan Viles
Molecular Biology
The Effects of Roundup on Tetrahymena thermophila Growth and Cytochrome p450 Gene Expression

Taryn Stewart and Amelia Konen
Molecular Biology
Effects of Fatty Acids from Coconut and Olive Oil on Expression of the HMG1 Gene and Feeding Habits in Tetrahymena thermophila
Session 2: Presentations  10–10:45 a.m.

2A: FLEX THEATRE, LOWER CAMPUS CENTER
Rachel Prevost and Simrit Gill
Media Portrayal of Cyberbullying and Traditional Bullying
An analysis of media portrayals of bullying and cyberbullying: Using Mean Girls and The DUFF to analyze how the media portrays high school bullying
Kayla Chipongian
Latin American Studies
The Effects of Zika on Women in the United States and Brazil
Stephen Szambelan
Juvenile Delinquency
Rehabilitate, Punish, or Both?

2B: SIENA ROOM, LOWER CAMPUS CENTER
Matthew Wiltsey
Portuguese Colonial History
Subjects of the Portuguese Colonial Empire
Briana Morgan and Marko Prizmic
Marketing
Build the Roof
Jerry Lyle, Chasa Bowen and Dylan Kresge
Civil Engineering-Broadfield
Gilman Drive Sewer Improvement Project

2C: ROSS ROOM, LOWER CAMPUS CENTER
Dakota Dunlap and Paul Hart
Civil Engineering
Acid Rock Drainage Transfer System for the Gilt Edge Mine
Lydia Schmidt
History
The House in the Golden Sun: The van Keerbergen printing dynasty, 1552-1629
Krysten Abboud, Amber Griffin, Tori Johnston, Elinor Krafsky, and Vivienne Youn
Psychology
Caffeine and Memory – Friends or Foes?

2D: RICE ROOM, LOWER CAMPUS CENTER
Trey Scofield
Mathematics
Predicting Chaotic Behavior in Electrical Circuits
Madelyn Slaton-Sanford and Allison Hance
Anthrozoology
Service dogs and veterans: A systematic review
Mariah Swenson
Spanish and Literature
Perception or Reality? U.S. Portrayals of Mexican Immigrants vs. Mexican Immigrant Literature

Session 3: Presentations  11–11:45 a.m.

3A: FLEX THEATRE, LOWER CAMPUS CENTER
Rachel Bechtel, Esmeralda Campos, Kadence Kastner and Rebecca Whitesell
Psychology
Desensitization to the Female Body
Jake Oliver and Justin Marsh
Engineering
Anchor Hill Pit Transfer System
John Cooney
Philosophy of Religion
Towards a Renewed Mysticism: Epistemic Standards in Theory and Practice

3B: SIENA ROOM, LOWER CAMPUS CENTER
Patrick Oster
Geographical Information Systems
Using Normalized Difference Vegetation Index to Model Culex Tarsalis Range in Montana
Bret Chartton
Spanish
Oro y plata: Creating Cultural Literacy in Montana Language Classrooms
Samantha Trudeau
Political Science
Polytopric Socrates’ Implicit Defense of Philosophy: Lying, Justice, and Sophistry in Plato’s “Lesser Hippias

3C: ROSS ROOM, LOWER CAMPUS CENTER
Andy Villalobos
Mathematics & Computer Science
Computer Vision and Handwriting Analysis
Hailey Kellum
Political Science
Rural Values in Montana
Marcello Cavalli
African Campaign in World War One
The East Africa Campaign: General Lettow-Vorbeck’s Guerilla Campaign Through East Africa

3D: RICE ROOM, LOWER CAMPUS CENTER
Kennedy Bahm
Natural Resource Economics
Cost Benefit Analysis of the Montana Energy Security Act
Terry Cox
Mathematics & Data Science
Discovering Partial Differential Equations using Data Driven Techniques
Olivia Mahon
Interdisciplinary: Theology, Spanish, Sociology and Latin American Studies
Providing Social Services to Latino Immigrants - A Theological Perspective

3E: AVILA/DESMET ROOM, LOWER CAMPUS CENTER
Anna Wurzer
Literary research
The Impact of the Views of Native Americans on Abbey’s Stance on Ecosabotage
Colter Brustkern, Steve Clinch and David Nielsen
Engineering - Senior Design
C R Anderson Parking Lot Expansion
Nathaniel Burman
Biochemistry
Investigating the Action of Csx3: A CRISPR Associated Protein with RNase Activity
4A: FLEX THEATRE ROOM, LOWER CAMPUS CENTER
Amy Telck
Mathematics and Economics
Montana Underground Storage Tank Impact Model
Marko Prizmic, Maija Hadwin and Sophia Rodrigues
Social Justice
Our Journey: A look into Catholic Social Teaching
Kelly Brotszel and Connor Brandon
Neuropsychology
Factors Important in Developing Depression in Undergraduates

4B: SIENA ROOM, LOWER CAMPUS CENTER
Kelsie Watkins
Gender & Media Studies
An Analysis On Gender Inequality Through Cross-dressing using She's The Man: How Masculinity Gets You Ahead In Lifes
Daniel Olszewski
Applied Data Science in Biology
Deep Learning on Small Data: Guiding Radiation Therapy with Neural Networks
McCabe Webb
International Relations
Shifting Sands and Shifting Powers: The Effect of the Dissolving of the Iranian Nuclear Deal on the Power Dynamics of the Middle East

Session 4 Presentations 1–1:45 p.m.

4C: ROSS ROOM, LOWER CAMPUS CENTER
Delaney Burrows
Animal Physiology
The Influence of Antimicrobial Peptides, Cutaneous Microbial Communities and Water Quality on the Susceptibility of Columbia Spotted Frogs (Lithobates luteiventris) to Chytridiomycosis
Isabella Minudri
Creative Writing
Here Comes the Rain
Samantha Eby
Nursing
Circling the Drain: Examining Hospitalization Induced Depression and Post-Hospital Syndrome, Treatment Non-adherence, and Subsequent Readmission

4D: RICE ROOM, LOWER CAMPUS CENTER
Aggie Putnam
Political Science
Rural Resentment in Montana’s 2018 Election
Ashley Maes
Theology
The Importance of Spiritual Care in the Treatment of Mental Health
Andrew Johnson
Computer Science & Mathematics
Utilizing Role Based Modeling Language To Determine a System’s Safety From an Advanced Persistent Threats

4E: AVILA/DESMET ROOM, LOWER CAMPUS CENTER
Hannah Decker
Anthrozoology
Canine Archaeological Scent Detection
Haley Meredith
Gender Studies
The 1980’s: Interviews with Carroll’s Women on Gender Politics
Anna Christman
Environmental Science
Cave Dwelling Dust Bunnies: Lint Accumulation and Microplastics in Lewis and Clark Caverns State Park

Session 5 Presentations 2–2:45 p.m.

5A: FLEX THEATRE ROOM, LOWER CAMPUS CENTER
Connor Hague and Hannah Sylvester
Gender Studies
Campus Climate Survey: Sexual Assault at Carroll
Sierra Gramm
Theology
Caring for the Mind, Body, Heart, and Spirit: A Holistic Model of Ministry
Ryan Keith and Colbey Bruney
Water Distribution
Brownfields Water Distribution

5B: SIENA ROOM, LOWER CAMPUS CENTER
Carter Anderson
Biogeographical Factors on Evolutionary Relatedness
Hawaiian Honeycreeper Phylogenetics: An Investigation of Adaptive Radiation
Kaitlyn Yuzelitis and Abbie Bliss
Psychology
Negative Emotional States as Predictors for Fear of Missing Out
Conor Coutts
Interdisciplinary
The Child Sexual Abuse within the US Catholic Church: Integrant of Incontinence

5C: ROSS ROOM, LOWER CAMPUS CENTER
Joshua Stokman
Invasive Species
The Effect of Shade and Soil Moisture on the Biomass and Growth Rates of Humulus japonicas (Japanese Hops)
Xander Piedra
Spanish
Revalidación Económica: The Change of Chilean Economic Principles in the 1970s
Peri Dropping and Theresa Wadsworth
Communication/Mass Media Studies
Media and The Discussion of Sexual Crimes: The Evolution of Media Treatment of High-Profile Sex Crime Accusations

5D: RICE ROOM, LOWER CAMPUS CENTER
Ayla Carpenter
Marketing
Is it Possible to Combine Sales and Marketing with Research for an Academic Conference
Chas Douglas
Literature and Culture
The Harem: A Contested Space
Donovan Lucibello
Antibiotic Resistance
Space Race, Siri and the Central Dogma: A Contemporary Nursing Analysis of Antibiotics Resistance

5E: AVILA/DESMET ROOM, LOWER CAMPUS CENTER
Daniel Olszewski
Machine Learning
A Convoluted Approach for Colorizing Photos
Angela McArdle, Jacob Ackeret, Diego Carbone and Kyle Jones
Entrepreneurship
Entrepreneurship Panel Presentation
Effect of Beta-Methylamino-L-Alanine on LC4A Expression and Growth in *Tetrahymena thermophila*

Audrey Yaeger and Mackenna Landis

Breastfeeding Duration

Breastfeeding Education on Effect of Prenatal and Postnatal Nursing

Emma Lawver, Melissa Patterson

River of Western Montana

Simulium arcticum in the Blackfoot on Cytotype and Presence of Effect of Environmental Factors Biology

Rousseau and Woolf

Public Image as Seen Through Honors Scholars Program

Mary Smith

A Woolfian Analysis of Wollstonecraft

Honors Scholars Program

Rachel Bechtel

To See God - Analyzing Christian Perceptions of God

Honors Scholars Program

A Woolfian Analysis of Wollstonecraft

Mary Smith

Honors Scholars Program

Public Image as Seen Through Rousseau and Woolf

Dylan Jones and Nathaniel Burman

Molecular Biology

Investigating the Effect of Phytosterol Concentration on the DES7 Gene and Feeding Behavior in *Tetrahymena thermophila*

Taryn Stewart

 Biology

Effect of Environmental Factors on Cytotype and Presence of *Simulium arcticum* in the Blackfoot River of Western Montana

Emma Lawver, Melissa Patterson and Ashley Stead

Nursing

Effect of Prenatal and Postnatal Breastfeeding Education on Breastfeeding Duration

Audrey Yaeger and Mackenna Landis

Molecular Biology

Effect of Beta-Methylamino-L-Alanine on LC4A Expression and Growth in *Tetrahymena thermophila*

Clare Fogarty

Honors Scholars Program

The Role of Power as Argued by Thomas Hobbes and Primo Levi

Morgan Shinkus

Honors Scholars Program

On Lysiastra, Freud, and Sex

Kaylee Warren and Bailey Soiseth

Nursing

The Effects of Art Therapy on Symptom Management of Alzheimer's Disease

Jessica Allsup, Taylor Dahl and Dana Roberson

Nursing

Relationship Between Nurse-Patient Ratios and Nurse Burnout Rates

Jade Combs

Chemistry

Oxidative Dimerization of 1-(2-thienyl)-pyrene and 2-methylthiophene

Rowan Van Brandt and Angela Tacey

Nursing

Exploring Radon Exposure Therapy for the Control of Chronic Pain

Scott Sponholz, Amelia Schuver and Mary Van Dyke

Mental Health Nursing

Elevation Complication: Implications for Mental Health

Katherine Anderson

Honors Scholars Program

The Motivations of Man to Enter Into Civil Society: An Analysis of Thomas Hobbes and Aristotle

Tianna Sell, Katie Huisman and Matt Kvech

Molecular Biology

Studying the Effects of Electronic Cigarette Aerosol Exposure on DNA Repair and Cell Growth in *Tetrahymena thermophila*

Seth Berkowitz and Samantha Mundel

Molecular Biology

Effects of Ethanol on the Gene Expression of uracil DNA N-Glycosylase and Growth rate in *Tetrahymena thermophila*

Brittany Cory

Health Sciences

Prevention and Management of Sarcopenia Through Nutrition and Exercise: Latest Research Evidence

Sheila Wall and Christine Connolly

Nursing

Antidepressants & Pregnancy: Are the Benefits Worth the Risk?

Mary Hall and Katie Grenier

Transgender Healthcare

Improving Transgender Healthcare

Sarah Butler and Jazmine Townsend

Molecular Biology

*Tetrahymena* VMA1 Gene Expression and Feeding Behavior After Exposure to Lead Salt

Andrew Matheison

Political Science

Split Ticket Voting and the 2018 Election

Abby Hammermeister

Botany

Sunlight Requirements for Flowering of *Humulus lupulus* (Hops) Varieties in Montana

Anna Saponi and Brianna Bivens

Global Change Ecology

Invasion in the Nation: How Does Temperature During Dormancy Influence Germination Rates of *Humulus japonicus*?

Emily Larson

Gender Studies & Political Science

The Efficacy of Gender Quotas on Political Representation

Austin Dobrecevich

Chemistry

Photoelectrochemical Oxidative Homocoupling of 1-(2-thienyl)pyrene

Julia Wilbur and Brynna Staufer

Nursing

Can Vitamin D Effect Falls in the Elderly?

Kylee Hughes, Kendall Frederics and Wendelin Giesler

Environmental Science

Sevenmile Creek Restoration Monitoring Program

Sarah Diaz and Ashley Kittson

Nursing

Maggot Debridement for Diabetic Foot Ulcers

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Can Vitamin D Effect Falls in the Elderly?
Keynotes

Wednesday, April 24
“Copper, the Capital, and Carroll”
by Dr. Keith Edgerton, History Professor at MSU Billings
7:00pm    WIEGAND AMPHITHEATER, SIMP 101/202
Reception to follow in the SCOLA.
Free and open to public.

Carroll College was founded during the early, formative period of Montana’s colorful late 19th and early 20th century history. It was an age when copper mining in Butte influenced nearly all facets of political, social, and economic life in Montana, including the epic, statewide donnybrook between the copper mining rivals (our famed Copper Kings), Marcus Daly and William A. Clark, over determining which Montana city would be fortunate enough to become Montana’s permanent capital city. In 1894 Helena won, albeit with the narrowest of margins. Mining also drew thousands of immigrants, many from predominantly Catholic-leaning countries or regions of the world. As such, Montana had an exceptionally large number of Catholics and the power of the Catholic faith was widespread in Montana and ultimately led to the founding of Carroll College in 1909. My hope is to speak on the colorful politics of the era, the impact of mining and Big Money on the famed capitol fight of the early 1890s and then segue into political scandals in Helena around the turn of the century and then place the founding of Carroll in this particular political context and sort of free-wheeling economic and political environment.

Thursday, April 25
“Keck Observatory Laser Show: Technology that’s Improving our Vision of the Universe”
by Dr. Marc Kassis, Keck Observatory Astronomer
7:00pm    WIEGAND AMPHITHEATER, SIMP 101/202
Free and open to public.

The W. M. Keck Observatory uses two adaptive optics systems equipped with laser guide star technology to take the “twinkle” out of star light. The adaptive optics technology sharpens images taken with the two twin 10 meter diameter Keck Observatory telescopes that are currently the largest optical and near-infrared telescopes on the planet. Forward thinking Keck scientists are constantly innovating and adding new technology to the telescopes to keep it at the cutting edge of research astronomy, and this includes updates to our adaptive optics systems that reveal unprecedented detail of astronomical objects. During this presentation, you will get a sense of the development of adaptive optics on the Keck Observatory telescopes, the science it enables, and how this technology can improve our vision.