



DISCOVER

CREATIVE INQUIRY

SOLVING REAL-WORLD PROBLEMS

CAREER PREPARATION

UNDERGRADUATE RESEARCH



SMALL GROUP COLLABORATION

IN EVERY MAJOR, FOR EVERY STUDENT



HANDS-ON EXPERIENCE



**CLEMSON
CREATIVE INQUIRY**

CLEMSON.EDU/CI

BY THE NUMBERS 2018-2019

STUDENTS BY CLASS

4,686 STUDENTS



PROJECTS BY COLLEGE

392 PROJECTS



MENTORS BY COLLEGE

458 MENTORS



WHERE IS CI?

BIRMINGHAM, AL • DAUPHIN ISLAND, AL • MOBILE, AL • TUSCALOOSA, AL
GLENDALE, AZ • PHOENIX, AZ • TEMPE, AZ • ANAHEIM, CA • IRVINE, CA
BEACH, CA • LOS ANGELES, CA • OAKLAND, CA • SAN FRANCISCO, CA
• SAN FRANCISCO, CA • SAN JOSE, CA • BOULDER, CO • WASHINGTON, DC
• BOCA RATON, FL • CORAL GABLES, FL • GAINESVILLE, FL • JACKSONVILLE, FL • MIAMI, FL
• ST. AUGUSTINE, FL • TALLAHASSEE, FL • TAMPA, FL
• ATHENS, GA • ATLANTA, GA • AUGUSTA, GA • CANTON, GA • MARIETTA, GA
• MACON, GA • NORCROSS, GA • SAVANNAH, GA • STATESBORO, GA
HI • MAUI, HI • CHICAGO, IL • BLOOMINGTON, IN • INDIANAPOLIS, IN
BEND, IN • KANSAS CITY, KS • OVERLAND PARK, KS • LEXINGTON, KY
• MURRAY, KY • BATON ROUGE, LA • NEW ORLEANS, LA
AMHERST, MA • BOSTON, MA • CAMBRIDGE, MA • WORCESTER, MA
MD • BALTIMORE, MD • LINTHICUM, MD • ORONO, ME • PORTLAND, ME
MI • MINNEAPOLIS, MN • KANSAS CITY, MO • ST. LOUIS, MO
ASHEVILLE, NC • CASHIERS, NC • CHAPEL HILL, NC • CHARLOTTE, NC
• GREENSBORO, NC • RALEIGH, NC • SOUTHPORT, NC • WASHINGTON, NC
• NEWARK, NJ • ALBUQUERQUE, NM • SANTA FE, NM • LAS VEGAS, NV
RENO, NV • BUFFALO, NY • MANHATTAN, NY • NEW YORK, NY
SYRACUSE, NY • OKLAHOMA CITY, OK • EUGENE, OR • PORTLAND, OR
• PITTSBURGH, PA • PROVIDENCE, RI • ALBANY, VT
SC • CLEMSON, SC • CLINTON, SC • GORHAM, ME
• ANDERSON, SC • KIawah ISLAND, SC • MYRTLE BEACH, SC
• ISLAND, SC • SPARTANBURG, SC • WILLIAMSBURG, VA
• FALLEN CREEK, TN • JOHNSON CITY, TN
• NASHVILLE, TN • OAKRIDGE, TN • STATE COLLEGE, PA
• EL PASO, TX • SAN ANTONIO, TX • NEW ORLEANS, LA
• OGDEN, UT • JACKSONVILLE, VA • CHARLOTTE, VA
FAIRFAX, VA • FREDERICKSBURG, VA • LYNCHBURG, VA
• WINTERGREEN, VA • SEATTLE, WA • LA CROSSE, WI



Building Healthier
Communities in the DR

Regional, National, International

Human-Elephant Conflict in Asia



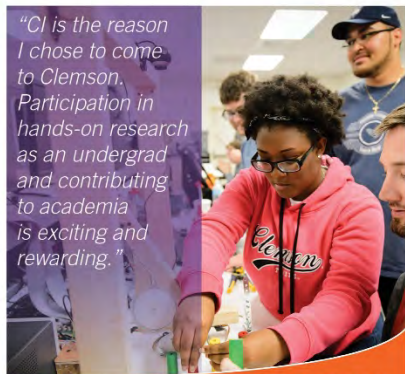
-  Conference Travel
-  Project Sites

WHY STUDENTS PARTICIPATE IN CREATIVE INQUIRY



"I really enjoyed the opportunities it opened up for me outside of the university. Such as, going to conferences and being able to express my ideas and work to people in many different fields of research."

CAREER PREPARATION



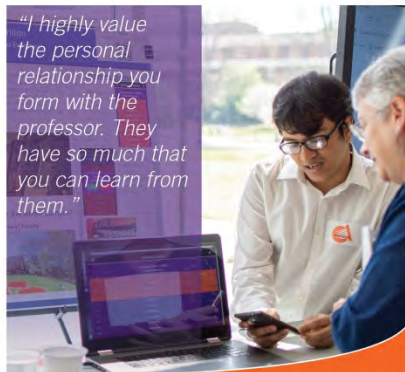
"CI is the reason I chose to come to Clemson. Participation in hands-on research as an undergrad and contributing to academia is exciting and rewarding."

HANDS-ON RESEARCH



"CI helps me apply what I learn to real world problems and in turn gives me enthusiasm to learn more from my classes."

REAL-WORLD EXPERIENCE



"I highly value the personal relationship you form with the professor. They have so much that you can learn from them."

NETWORKING



"This was a really good chance to build the skills you need to work with people who are different from you."

TEAMWORK

FACULTY INCENTIVES

Faculty do not receive salary from CI

May be incorporated into workload (per department)
For many faculty, CI is an overload

Non-salary incentives

Assistance with research

- Data collection/ analysis
- Exploring new topics

Travel funds for taking CI students to present at conferences

Publication opportunities

Publicity through CI

Project supply funds



HOW FACULTY FIND SUPPORT

Creative Inquiry mentors have received more than 148 external grants from organizations such as...



U.S. Department
of Veterans Affairs



National Institutes
of Health



The Creative Inquiry magazine is produced annually by undergraduate students



All projects are described online

<http://www.clemson.edu/ci>

PHIL & MARY BRADLEY AWARDS FOR MENTORING

The Phil and Mary Bradley Awards for Mentoring in Creative Inquiry are presented each spring in recognition of outstanding work with undergraduate students. Nominations are accepted from student participants in Creative Inquiry team projects. The awards are made possible by an endowment and generous gifts from Phil and Mary Bradley.



GRADUATE STUDENT AWARDS

Previous Graduate Student Award Recipients

- 2018 — Christopher Mayerl, Biological Sciences & Drew Morris, Psychology
- 2017 — Dotan Shvorin, Industrial Engineering
- 2016 — Alice Brawley, Psychology



AWARDS FOR MENTORING

Previous Faculty Award Recipients

- 2018 — Arelis Moore de Peralta, Languages; Youth, Family & Community Studies
- 2017 — Vladimir Reukov, Bioengineering
- 2016 — Michael Sehorn, Genetics and Biochemistry
- 2015 — Michael J. Childress, Biological Sciences
- 2014 — Heather Walker Dunn, Animal and Veterinary Sciences
- 2013 — Molly Kennedy, Materials Science and Engineering
- 2012 — John DesJardins, Bioengineering
- 2011 — Delphine Dean, Bioengineering
- 2010 — June J. Pilcher, Psychology
- 2009 — Karen Kemper, Public Health Sciences
- 2008 — Susanna Ashton, English
- 2007 — Mark Charney, Performing Arts

CARR FAMILY ENDOWMENT



The Carr Family Endowment provides a monetary award to a new or existing CI project to enhance eligible research initiatives.

Projects must focus on one or more of the following areas:

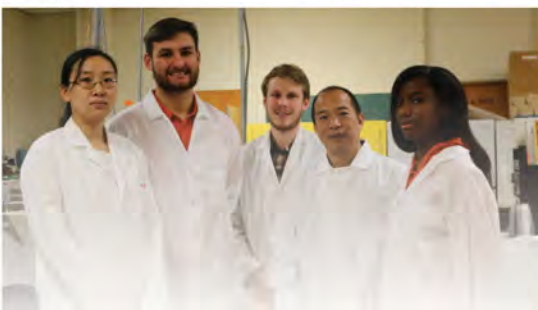
- Rural Economic Development
- Rural Community/Business Development
- Fruit, Vegetable/Crop production
- Production Agriculture Industries



Carr family gifts and the endowment have supported the research activities of more than 48 students.

Projects Include:

- Breaking Bud: Investigating the Environmental Control of Spring Bloom Timing in Peaches
- Nutraceutical and Functional Foods Research and Product Development
- Surface Crust Freezing of Peaches for Shelf Life Extension



NEW INITIATIVES

CI Launch - One-semester CI projects

- Designed as introductions to research
- Primarily for first and second-year students
- Not intended to continue (with the same students) over multiple semesters



Corporate CI

Beckman Scholars Program



Cataloging all forms of Undergraduate Research

- Includes department-by-department review of all 'research' courses and how they are used
- Initial data collected by CI faculty team

Summer Showcase - August 20, 2019

- All summer student researchers are invited to display their work
- Presentations of digital and paper posters; other artifacts as appropriate to the project and discipline

A NEW FRAMEWORK



TARGET AUDIENCE	Freshman & Sophomore	All academic levels (with permission of mentor)
REQUIREMENTS	Apply through CI Website	Apply through CI Website
SKILLS DEVELOPMENT	Develop Basic Research Skills	Expand disciplinary and/or multidisciplinary research skills
PROJECT DURATION	One Semester; may be repeated with new students	Two or more consecutive semesters
INDIVIDUAL STUDENT PARTICIPATION	One Semester	Two or more consecutive semesters
DISSEMINATION OF RESULTS	Internal - FoCI and/or other Clemson events	Internal - FoCI // External - Professional Conferences (within first 2 years)
ASSESSMENT	Complete CI Surveys and submit reports each semester	Complete CI Surveys and submit reports and accomplishments each semester
FUNDS PROVIDED	\$500 per semester	up to \$2,000 per semester
ELIGIBLE FOR TRAVEL FUNDS	NO	YES - competitively awarded
ELIGIBLE FOR SUMMER CI FUNDS	NO	YES - competitively awarded
# PROJECTS PER MENTOR	4	4



CLEMSON[®]

CREATIVE INQUIRY

CORPORATE

Invites companies to engage talented, creative Clemson undergraduates in industry-relevant projects and in doing so contribute to building the workforce of the future.

- Students collaborate with industry to apply their knowledge and skills to ‘real world’ problems
- Honing of skills today for the evolving workforce needs of the future
- Industries gain visibility and opportunities to recruit interns or employees
- Industry sponsorship is credited as a gift to Clemson

Corporate Creative Inquiry is best suited for open-ended topics that can be addressed through iterative exploration, design, implementation and evaluation cycles.



Common themes expressed by industry

- Workforce
 - Must attract and/or compete for new employees
 - Want to connect with potential employees while they are in college
 - Need to help students understand their industries
- Employee preparation
 - Soft skills as well as technical skills

CI and Industries: A Natural Connection

- CI students at all levels, in all disciplines and in multidisciplinary projects
- Students LOVE 'real world' projects
- Students want to understand the world of work after Clemson

Conclusion – set up CI teams that give students insight into industry interests



Is...

- A student project
- Designed to provide student academic enrichment experiences
- An opportunity to work on real world topics/problems, ideally over multiple semesters
- An opportunity to accrue citable accomplishments with project results
- An opportunity to learn about an industry or corporation

Does not...

- Produce IP
- Promise exclusive deliverables, other than reports
- Replace a contract or sponsored program
- Provide an industry collaborator with exclusive rights to results

BENEFITS & OPPORTUNITIES



- An attractive way to introduce new corporate partners to Clemson
- Appropriate as a component of larger gifts
- Gives undergraduates a glimpse into ‘real world’ work topics
- Supports Clemson Forward goals:
 - Undergraduate student engagement
 - Research productivity (publications and presentations)
 - Increase the number of graduate students (by providing support)
- Graduate students involvement may:
 - Provide day-to-day mentoring for the undergraduate CI team
 - Serve as an interface with the faculty
 - Make projects attractive to faculty and departments
 - Lead to formal research funding

CLEMSON
FORWARD

ClemsonForward Strategic Plan

- 2 Introduction by President James P. Clements, Ph.D.
- 3 Clemson University Vision, Mission and Strategic Priorities
- 4 ClemsonForward Executive Summary
- 5 10-Year Aspirational Targets
- 7 Building Blocks of ClemsonForward: Strategic Priorities and Core Strategies for Success
 - 9 Strategic Priority 1: Research
 - 11 Strategic Priority 2: Engagement
 - 13 Strategic Priority 3: Academic Core
 - 14 Strategic Priority 4: Living
- 16 Key Enablers Supporting ClemsonForward
 - 16 Strategic Revenue Growth
 - 17 Building Futures
 - 18 College Reorganization
 - 18 Accountability and Leadership
- 19 Implementing ClemsonForward
- 19 Planning Background, Implementation Timeline and Chronology

PROJECT SPOTLIGHT

Siemens Marketing Research Project

What happens to a company if it abruptly loses a significant percentage of its most experienced employees?

Three cohorts of 6 to 10 students work to understand and improve organizational knowledge transfer.



Dr. Anastasia Thyroff
THYROFF@clemson.edu



Dr. Jennifer Siemens
JSIEMEN@clemson.edu

Three Year – Multi-Phase Project

Phase 1 – Interviews and Focus Groups

Phase 2 – Design of Training Plans

Phase 3 – Implementation



PROJECT SPOTLIGHT



Simulation Methods in Graphics and Engineering

This Creative Inquiry explores a selection of simulation methods specifically focusing on the differences between engineering simulation and graphics simulation, lead by a team of mentors from the departments of Computer Science, Materials Science and Engineering, and Mechanical Engineering.



We Fit Your Life.TM



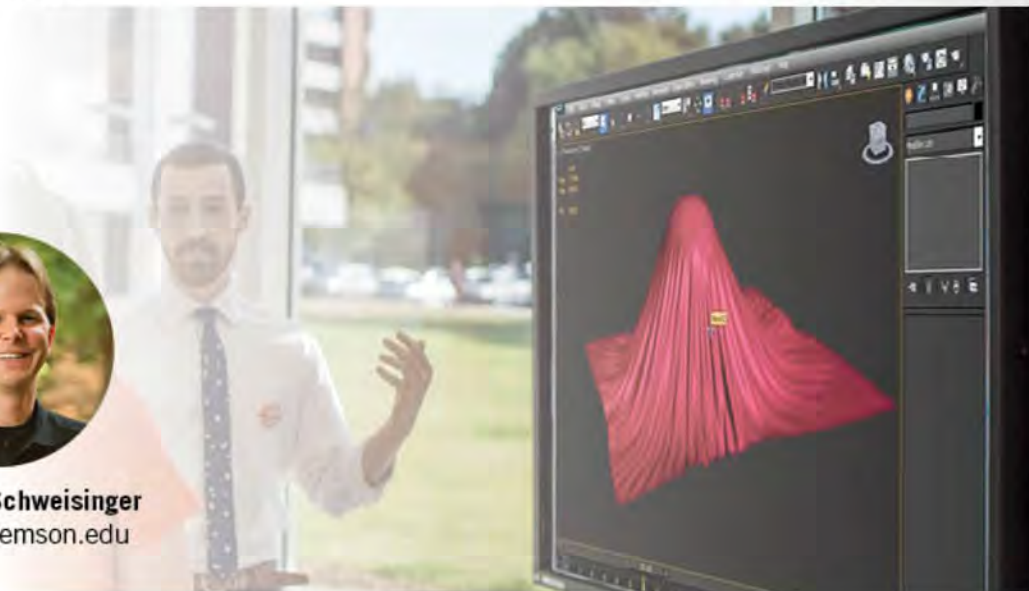
Dr. Victor Zordan
vbz@clemson.edu



Dr. Olga Kuksenok
okuksen@clemson.edu



Dr. Todd Schweisinger
todds@clemson.edu



Beckman Scholars Program

2019 – 2022 grant from the Arnold and Mabel Beckman Foundation



Supports exceptional undergraduate researchers (in designated depar

- Bioengineering
 - Biological Sciences
 - Chemistry
 - Chemical and Biomolecular Engineering
 - Genetics and Biochemistry
 - Materials Science and Engineering
-
- Launches them into research careers
 - <http://newsstand.clemson.edu/mediarelations/clemson-selected-as-beckman-scholar-institution/>
 - <https://www.clemson.edu/centers-institutes/watt/creative-inquiry/opportunities/beckman.html>

CI Support for Overall Undergraduate Research

Permits faculty to **assemble their undergraduate laboratory undergraduate researchers into CI teams**

- Supports project supplies and conference travel for those teams
- Collects, analyzes and distributes data on products from those teams
- Supports summer undergraduate research (Summer CI)
 - for CI and other undergraduate researchers

All student researchers (not just CI) invited to present at the annual **Student Research Forum**

Instruction in creating **digital posters and other artifacts** for all students researchers using the Watt Center

CI helped the graduate student organization to create **GRADS**

2019 (current) **college-by-college faculty-led study of the CI and undergraduate research environment**

- Exploring departmental culture
- How undergraduate research is used within and outside of the curriculum
- Faculty incentives



CLEMSON[®]
CREATIVE INQUIRY +
UNDERGRADUATE
RESEARCH

Past Support for Undergraduate Research

Managed Clemson's role in the **Atlantic Coast Conference Academic Collaborative (ACCAC)** (2006-2015)

- ACCAC Undergraduate Research conference - Clemson sponsored the first in 2006; sent student delegates to all since
- ACCAC Fellowships for Creativity and Innovation
- ACCAC Summer Undergraduate Research

In past years, offered **searchable online databases** describing off-campus undergraduate research opportunities

- Initially, a home-grown online database
- Next, offered a commercial system – Student Opportunity Center (SOC)

Campus-wide study of all types of Academic Engagement, including Undergraduate Research (2012-2013)

Howard Hughes Medical Institute support for student research:

- Undergraduate students research during the academic year (2006-2015)
- International undergraduate student research during the summers (2006-2015)
- Support for high school student research during the summers (1999-2015)

Undergraduate student research with **Cooperative Extension** agents

Potential CI Support for Undergraduate Research

Publicity for all undergraduate research accomplishments

Campus-wide Summer undergraduate research forum

- For REU and other summer research projects
- In July – before REU and other summer programs students leave campus
- Could include the SPRI (high school) students

Searchable online database for ON –campus undergraduate research opportunities

- Difficult to maintain – relies on faculty to submit information

Funds for non-CI undergraduate research

- Would need a funding source and a decision process
- Unlikely to satisfy all needs

What else is wanted?

QUESTIONS?

clemson.edu/ci

Barbara Speziale bjspz@Clemson.edu 864.656.1550
Cora Allard callara@Clemson.edu 864.656.0721

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Examples of Corporate CI Projects



Qualitative Marketing Research (Siemens)

Dr. Jennifer Siemens and Dr. Anastasia Thyroff (Marketing)

Simulation Methods in Graphics & Engineering (VF Corporation)

Dr. Victor Zordan (Digital Production Arts), Dr. Olga Kuksenok (Materials Science & Engineering) and Dr. Todd Schweisenger (Mechanical Engineering)

Real-Time Data Visualization for Manufacturing Decision Support (Ulbrich)

Dr. David White and Dr. Hudson Smith, Watt Family Innovation Center

Real-Time Visualization & Modeling for Smart Building Management (SAS)

Dr. David White and Tim Howard, Watt Family Innovation Center

IBM Watson in the Watt (IBM)

Dr. KC Wang and Dr. Hudson Smith, Watt Family Innovation Center

Two additional projects to begin in Spring 2019.

PROJECT SPOTLIGHT

Using Virtual Reality With the Campus Visit Experience

Providing unique experiences and unique applications in VR.

- Innovative approach to virtual tours
- Platform agnostic web-based app
- Viewed on screens or headsets
- Interactive 360 images and videos



There are 12 CI projects that utilize VR in their research or build VR content.

Veteran's History Project

Preserving and honoring the stories of American combat veterans from all conflicts throughout our country's history

Initiated by Colonel Lance Young, Air Force ROTC, this Creative Inquiry project provides digital and archived, firsthand accounts of the sacrifices those that serve in the armed forces make on our behalf.

Since Fall 2012, more than 70 video interviews of veterans, have been digitally archived
YouTube channel: www.youtube.com/user/cuветproject/

This Creative Inquiry project also assists the Library of Congress with its Veterans History Project at the American Folklife Center.



Engineers without Borders

Performing well yield tests and repurposing solar panels from an abandoned well

Re-purposing solar panels from an abandoned well to pump water for the farm (The Gambia).

The completed pump house (Nicaragua)

Constructing a certified hurricane-proof pump house out of recycled materials



Scroll of Honor

The Scroll of Honor is a tribute to the 491 students and alumni that gave their lives.

This Creative Inquiry is led by a multidisciplinary team of faculty and students. They facilitate awareness of Clemson's history and continued traditions.

They are in the process of designing an interactive kiosk and a mobile app that will highlight stories of the brave men and women listed.

Some names on the scroll are as recent as the conflicts in Iraq and Afghanistan, meaning that some of our students and faculty knew the people's names long before they became memorialized.



“I am honored to know that I am attending a school that produced such brave people who fought to give the freedoms that I enjoy today”

Creative Play

Led by Dr. Michael Carlos Barrios Kleiss from the School of Architecture, students seek to redefine the function of LEGO® .

The students recreated an entire Palladian-style villa. They had to use the rules of renowned Renaissance architect, Andrea Palladio but with their own twist. The team had to readapt to a few new rules so the LEGO® style could match the actual architectural style.

This project helps students understand style and design science. It also gives them an impressive addition to their architectural portfolios.

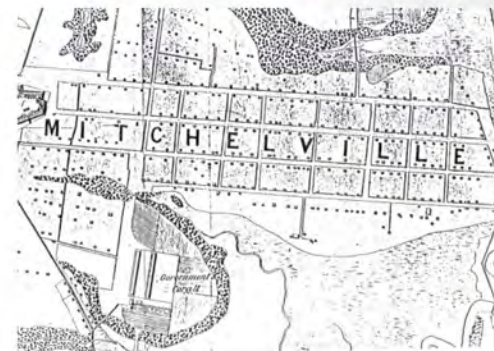


Reconstructing Historic Mitchelville

Three different CI projects work together: Reconstructing Historic Mitchelville; The Churches of Mitchelville; and Upstate Black Communities Then and Now: Their People and Their Places.

Students collect oral histories and conduct genealogical research. They work collaboratively with the libraries and historical preservation societies in the communities.

Students travel to Hilton Head Island to hear lectures, visit sites and collect oral histories. The students get the opportunity to meet CEO's, leaders of non-profits and artists in the community.



Marine Conservation in the Keys

Members of Dr. J. Antonio Baeza's Marine Conservation and Genetics Creative Inquiry team dive among corals in search of Caribbean spiny lobsters.

The group collects data on the reproductive biology and life history of marine organisms targeted by fisheries to provide information that can help federal and state entities properly manage species.

Without this research to understand these at-risk populations, many species could suffer further population declines.

This Creative Inquiry project also assists the Library of Congress with its Veterans History Project at the American Folklife Center.



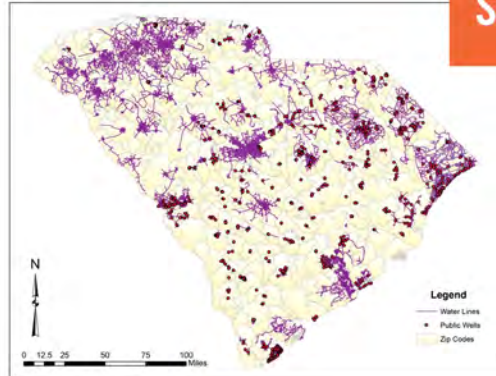
Evaluating Water Quality and Kidney Stone Correlations in South Carolina

This project uses geographic information systems (GIS) to analyze water sources, Ca/Mg concentrations and kidney stone incidences

Communication skills are a key for this team as they set out to find missing water quality information. They have to contact each water treatment facility in the state.

“We aim to determine the geospatial distribution of kidney stone incidence with respect to Ca and Mg concentrations in the drinking water supply of SC”

-Dr. David Ladner,



Graham Greene's *The Comedian*

Exploring sites in Haiti

“Graham Greene’s 1966 novel *The Comedians*, is the focal point of this class trip: we are there to gather material for a set of multi-media annotations that we hope to make available for free online.”



Gift Funding

Corporate CI supports the full costs of a CI project

- Instruction, supplies, travel
- Topics may be peripheral to faculty research
 - Therefore need incentives to attract CI team mentors
- Estimated cost of \$50k/year or \$25k/semester
 - Costs may be higher for projects requiring specialized supplies, equipment or travel

Ideal project set-up:

- Two or more semesters of support (3-years preferred)
- Undergraduate team members
- Graduate student mentor with faculty supervision
- CI project contributes to graduate student research

All Corporate CI projects are managed through the CI office

