Student Research Opportunities through the U.S. National Science Foundation: Undergrad and Early Grad (mentors included)

Suzy C.P. Renn, Program Director
Division of Integrative Organismal Biology (IOS), Behavioral Systems Cluster
Directorate for Biological Sciences (BIO)
U.S. National Science Foundation (NSF)

Society for Integrative and Comparative Biology 2024
Seattle WA Jan 2-6
Come meet with us at SICB!

NSF Booth #208
open through Friday at 5pm.

Sign ups available for individual meetings with NSF staff.

Integrative Organismal Systems (IOS)
Behavioral Systems Colette St. Mary, Suzy Renn
Developmental Systems Anna Allen
Neural Systems Paul Forlano, Melissa Coleman
Physiological and Structural Systems Ted Morgan, Kathy Dickson, Miriam Ashley-Ross
Plant Genome Research Program dbipgr@nsf.gov
Leadership Denise Dearing, Michelle Elekonich
Science Advisor Julie Kellner
Administrative Staff Liz Wenker,

Molecular & Cellular Biosciences (MCB)
Genetic Mechanisms Steve DiFazio
The Government of the United States

(way oversimplified)

The Constitution

Executive Branch

Legislative Branch

Judicial Branch

Many Other Departments...
Directorate for Biological Sciences (BIO)

“To enable discoveries for understanding life, advance the frontiers of biological knowledge, and provide a theoretical basis for prediction within complex, dynamic living systems through an integration of scientific disciplines.
How the BIO Divisions Support Research Across Scales

Molecular and Cellular Biosciences (MCB)

Integrative Organismal Systems (IOS)

Environmental Biology (DEB)

Biological Infrastructure (DBI)

Emerging Frontiers (EF)
Integrative Organismal Systems (IOS)

### Core Programs

<table>
<thead>
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<th>Developmental Systems</th>
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<tr>
<td>Animal Behavior</td>
<td>Plant, Fungal, and Microbial Developmental Mechanisms</td>
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<td>Evolution of Developmental Mechanisms</td>
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<td>Symbiosis, Infection, and Immunity</td>
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<tr>
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<td>Plant Biotic Interactions (NSF-NIFA)</td>
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### Special Programs & Tracks

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<th>Plant Genome Research Program</th>
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| Enabling Discovery through GENomics (EDGE) | Organismal Response to Climate Change (ORCC) | Bio Inspired Design (BIODesign) |

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NSF
Environmental Biology (DEB)

Core Programs

**Ecology**
- Ecosystem Sciences
- Population and Community Ecology

**Evolution**
- Evolutionary Processes
- Systematics and Biodiversity Science
  - *PurSuiT and ARTS*

Special Programs & Tracks

- **Biodiversity on a Changing Planet (BoCP)**
- **Ecology and Evolution of Infectious Diseases (EEID)**
- **Long-Term Ecological Research (LTER)**
- **Long-Term Research in Environmental Biology (LTREB)**
- **Opportunities for Promoting Understanding through Synthesis (OPUS)**
# Molecular & Cellular Biosciences (MCB)

## Core Programs

<table>
<thead>
<tr>
<th>Cellular Dynamics and Function</th>
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<td>Molecular Biophysics</td>
<td>Systems and Synthetic Biology</td>
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## Special Programs & Tracks

1. **Building Synthetic Microbial Communities for Biology, Mitigating Climate Change, Sustainability and Biotechnology** *(Synthetic Communities)*
2. **Designing Synthetic Cells Beyond the Bounds of Evolution** *(Designer Cells)*
3. **Transitions to Excellence in Molecular and Cellular Biosciences Research** *(Transitions)*
# Supporting Researchers Throughout Their Career

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Leading Culture Change Through Professional Societies of Biology (BIO-LEAPS)
REU: Research Experiences for Undergraduates (P.I. perspective)

• Synopsis
  • Provides funding to engage undergrads in research
  • Two mechanisms:
    1. REU Sites: Centralized training of a group of undergrads in a theme-focused bioscience research. Sites include immersive dive into science and activities to develop student professional skills.
    2. REU Supplements: Supplements to new or existing awards to engage one or more students in the research activity
REU: Research Experiences for Undergraduates (Student perspective)

- Who: Undergraduates currently enrolled in 2 or 4-year college; U.S. citizens
- What: Undergraduate summer research internship
- Where: Both international and domestic programs
- When: Varies by program
- How: Find the list of REU sites on the NSF website; apply directly to an REU through their website or through ETAP

Applications include: (1) personal statement, (2) transcript and (3) two recommendations
Search for an REU Site

Astronomical Sciences
Atmospheric and Geospace Sciences
Biological Sciences
Chemistry
Computer and Information Science and Engineering
Cyberinfrastructure
Department of Defense (DoD)
Earth Sciences
Engineering
Ethics and Values Studies
International Science and Engineering
### Biology REU Sites

<table>
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<tr>
<th>Site Information</th>
<th>Site Location</th>
<th>Contact Information</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Northeastern University</strong>&lt;br&gt;REU Site: Teamwork in Biology Inquiry: From Molecules to Organisms Biology</td>
<td>Boston, Massachusetts</td>
<td>Primary: Wendy Smith (617) 373-2600 <a href="mailto:w.smith@neu.edu">w.smith@neu.edu</a>&lt;br&gt;Secondary: Rebeca Rosengaus (617) 373-7032 <a href="mailto:r.rosengaus@neu.edu">r.rosengaus@neu.edu</a></td>
<td>Research Topics/Keywords: Biology, interdisciplinary, development, regeneration, damage response, immunity Abstract of Award</td>
</tr>
<tr>
<td><strong>Northern Arizona University</strong>&lt;br&gt;REU Site: Ecology, Genetics, and Adaptation on the Colorado Plateau</td>
<td>Flagstaff, Arizona</td>
<td>Primary: Liza Holeski (928) 528-0701 <a href="mailto:liza.holeski@nau.edu">liza.holeski@nau.edu</a>&lt;br&gt;Secondary: Ted Martinez (928) 523-3383 <a href="mailto:Theodore.Martinez@nau.edu">Theodore.Martinez@nau.edu</a></td>
<td>Research Topics/Keywords: Biosciences, biology, environmental science, ecology, plant science Abstract of Award</td>
</tr>
<tr>
<td><strong>Northwestern University</strong>&lt;br&gt;REU Site: Synthetic Biology at Northwestern. From Molecules to Society (SynREU2.0) Center for Synthetic Biology</td>
<td>Evanston, Illinois</td>
<td>Primary: Danielle Tullman-Ercek (847) 451-7643 <a href="mailto:ercek@northwestern.edu">ercek@northwestern.edu</a>&lt;br&gt;Secondary: Gabriel Rocklin (312) 503-4226 <a href="mailto:grocklin@northwestern.com">grocklin@northwestern.com</a></td>
<td>Research Topics/Keywords: biosciences, synthetic biology, bioengineering, microbiology, biochemistry, metabolic engineering, applied mathematics Comments: Contact <a href="mailto:synbreu@northwestern.edu">synbreu@northwestern.edu</a> for information Abstract of Award NSFunded Engineering</td>
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IRES: International Research Experiences for Students

• Who: Undergraduates or graduate students who are citizens, nationals, or permanent residents of the U.S.

• What: International research opportunities involving mentoring by researchers at a foreign lab; usually involve small groups of students who travel to a host institution for a summer-length research project.

• How: To find active IRES projects, visit the NSF IRES Project Search. Each project lists the name and contact information of the Principal Investigator, or lead, of that project.
For Students Who want to Participate: Scroll Down

For Faculty who want to propose to run an IRES Program: View Guidelines
IRES Projects Funded-to-date

Awards made through this program

Browse projects funded by this program

Map of recent awards made through this program

Organization(s)
IRES Award Listing

**IRES Track I: Exploring Adaptive Responses to Dynamic Island Environments**  
Solomon Islands

- **Award Number:** 2025704  
- **Principal Investigator:** John Uy  
- **Co-Principal Investigator:**  
- **Organization:** University of Rochester  
- **NSF Organization:** OISE  
- **Start Date:** 01/01/2020  
- **Award Amount:** $211,960.00  
- **Relevance:** 48.0

**IRES Track I: US-Morocco Collaborative Research for Socially and Environmentally Sustainable Women’s Argan Oil Production**  
Morocco

- **Award Number:** 1952578  
- **Principal Investigator:** Tarek Deubel  
- **Co-Principal Investigator:**  
- **Organization:** University of South Florida  
- **NSF Organization:** OISE  
- **Start Date:** 09/15/2020  
- **Award Amount:** $180,000.00  
- **Relevance:** 48.0

**Collaborative Research: RUI: IRES - Track I: US-Australia collaboration on a new class of lead-free copper alloys to meet international health demands**  
Australia

- **Award Number:** 2106617  
- **Principal Investigator:** Lori Bassman  
- **Co-Principal Investigator:**  
- **Organization:** Harvey Mudd College  
- **NSF Organization:** OISE  
- **Start Date:** 10/01/2021  
- **Award Amount:** $201,193.00  
- **Relevance:** 48.0

**Collaborative Research: RUI: IRES - Track I: Brown Carbon Aerosol Formation by Photooxidation of Phenolic Compounds in Nanodroplets**  
France

- **Award Number:** 1825094  
- **Principal Investigator:** Lelia Hawkins  
- **Co-Principal Investigator:**  
- **Organization:** Harvey Mudd College  
- **NSF Organization:** OISE  
- **Start Date:** 11/01/2018  
- **Award Amount:** $143,328.00  
- **Relevance:** 48.0

**IRES Track I: US-Japan Collaboration on Organic Electronics Research and Education**  
Japan

- **Award Number:** 1827020  
- **Principal Investigator:** Matthew White  
- **Co-Principal Investigator:** Severin Schmeebili, Matthew White, David Puniahole  
- **Organization:** University of Vermont & State Agricultural College  
- **NSF Organization:** OISE  
- **Start Date:** 09/01/2018  
- **Award Amount:** $299,161.00  
- **Relevance:** 48.0

**Collaborative Research: IRES Track I: U.S.-Denmark program for advanced reliability analysis of ac/dc converters with INNOVATIVE controls in globe-spanning supergrid (INNOVATOR)**  
Denmark

- **Award Number:** 2152905  
- **Principal Investigator:** Masoud Davari  
- **Co-Principal Investigator:**  
- **Organization:** Georgia Southern University Research and Service Foundation, Inc.  
- **NSF Organization:** OISE  
- **Start Date:** 06/01/2022  
- **Award Amount:** $220,572.00  
- **Relevance:** 48.0

**IRES Track I: RUI: Monitoring of Marine Life Coastal Habitats via Autonomous Robot Systems**  
Costa Rica

- **Award Number:** 1952616  
- **Principal Investigator:** Christopher Clark  
- **Co-Principal Investigator:** Christopher Lowe  
- **Organization:** Harvey Mudd College  
- **NSF Organization:** OISE  
- **Start Date:** 09/01/2020  
- **Award Amount:** $300,000.00  
- **Relevance:** 48.0

**IRES Track II: Advanced Studies Institutes in Analysis on Fractal Spaces, Dynamical Systems and Mathematical Physics**  
Uzbekistan

- **Award Number:** 1953471  
- **Principal Investigator:** Zair Ibragimov  
- **Co-Principal Investigator:**  
- **Organization:** CSU Fullerton Auxiliary Services Corporation  
- **NSF Organization:** OISE  
- **Start Date:** 03/15/2020  
- **Award Amount:** $319,919.00  
- **Relevance:** 48.0

**Collaborative Research: IRES Track III: Bioinspired Autonomy in Natural Environments**  
Singapore

- **Award Number:** 1954172  
- **Principal Investigator:** Rolf Mueller  
- **Co-Principal Investigator:** Bevee Watford, Alexander Leonessa, Vinod Lohan  
- **Organization:** Virginia Polytechnic Institute and State University  
- **NSF Organization:** OISE  
- **Start Date:** 03/01/2020  
- **Award Amount:** $837,325.00  
- **Relevance:** 48.0

**IRES Track I: International Research Experience in France on Thermal Treatment of Biomass (1-CEMITURE)**  
France

- **Award Number:** 1952402  
- **Principal Investigator:** Rafael Quinino  
- **Co-Principal Investigator:** Kaarelle Aiken  
- **Organization:** Georgia Southern University Research and Service Foundation, Inc.  
- **NSF Organization:** OISE  
- **Start Date:** 09/01/2020  
- **Award Amount:** $279,827.00  
- **Relevance:** 48.0

**IRES: Track I: Insights into human evolution gained from genetic, morphological, and neuroscientific analyses at the Primate Research Institute of Kyoto University, Japan**  
Japan

- **Award Number:** 1853937  
- **Principal Investigator:** Anthony Tosi  
- **Co-Principal Investigator:** Owen Lovejoy, Mary Ann Raghanti, Richard Meinidi  
- **Organization:** University of Rochester  
- **NSF Organization:** OISE  
- **Start Date:** 09/01/2020  
- **Award Amount:** $134,000.00  
- **Relevance:** 48.0
RaMP Research and Mentoring for Post-baccalaureates in Biology

• Networks to support full-time research, mentoring, and training for recent college graduates who have had few or no research or training opportunities during college in research fields typically supported by BIO.

• Transitions into the STEM workforce could include pathways into research-focused M.S. or Ph.D. programs, industry, federal or state agencies, education and research centers, and other STEM careers.
NSF ETAP Education & Training Application

• Easy way to discover and apply to opportunities that strengthen your academic career.
• Principal Investigators of NSF Awards can customize NSF’s ETAP application to provide opportunities for applicants to participate in.
• ETAP does not include all of NSF Education and Training Opportunities available.
Opportunities to work at NSF

• **Summer Scholars Internship Program**
  - 10-week-long summer internship at NSF for undergraduate and graduate students.
  - Interns learn about science administration and how federal policies affect the science and engineering community.
  - Students interested in the NSF Summer Scholars Internship Program can apply through the [QEM Network](https://qemnetwork.org) or [Hispanic Association of Colleges and Universities National Internship Program](https://www.hacu-net.org/internshipprogram/).
Other Opportunities to work at NSF

• **Administrative Staff Positions** including Program Assistant, Program Specialist, Program Analyst, and Science Assistant

• **The Science & Technology Policy Fellowships** program provides opportunities for scientists and engineers to contribute to federal policymaking while learning firsthand about the intersection of science and policy.

• **The Mass Media Science & Engineering Fellowship** places science students and postdoctoral trainees in newsrooms to work as reporters, editors and production assistants.
Thinking about grad school?
GRFP Graduate Research Fellowship Program

• Who: Graduate or undergraduate student pursuing Master’s or PhD studies (U.S. citizen, national, or permanent resident)
• What: A 5-year year STEM fellowship (3 years of financial support)
• Where: At any U.S. Institution of Higher Education or non-profit organization
• When: Can apply as an undergraduate in their final year of study, recent graduates, and graduate students within the first 12 months of study
  • Applications due: Oct./Nov. each year
• How: To apply go to fastlane.nsf.gov/grfp
GRFP Graduate Research Fellowship Program

**Level 1: Seniors/bachelor's degree:**
- No graduate study

**Level 2: 1st-year graduate students**
- Joint bachelor’s-master’s (completed 3 years)

**Level 3: Second-year graduate students**
- No more than 1 academic year completed in 1st graduate degree program
- For joint BS/MS holders ONLY, can apply as 1st year doctoral students if went directly into PhD program, after completing joint bachelor’s-master’s degree

**Level 4: Returning graduate students**
- > 2-year interruption in graduate study
- No doctorates or >1 academic year in graduate program
- NOT ENROLLED in graduate program at application deadline

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*Amounts are based on GRFP Solicitation NSF 23-605*
What Makes You Unique as a Scientist?

As a cartoonist I take complex images and boil them down to key signatures to tell a story visually without text. This helps me express complex processes through simple schematics.

As a rock climber, you have to risk falling in order to become better; the same principle applies in science.

Woodworking has made me better at planning solutions several steps ahead.

Dancing connects my body & mind in a way that challenges me to question established truths and overcome my limitations.

https://science.sciencemag.org/content/sci/361/6397/24.full.pdf
Grants and Scholarships for Students

SICB offers grants and scholarships to support student research and attendance at the annual meeting.

- Student Research Support
  - Student Research Awards
  - Grants in Aid of Research
  - Fellowship of Graduate Student Travel
- Libbie H. Hyman Memorial Scholarship for Courses & Research at a Field Station
- Annual Meeting Support
  - Broadening Participation Professional Development Award
  - Charlotte Mangum Student Support Program
INTERN Non-Academic Research Internships for Graduate Students

• Who: Graduate Students in NSF funded labs (application as a supplement to the existing award)

• What: Provides graduate students with experiential learning opportunities through research internships to acquire core professional competencies and skills to support careers in any sector of the U.S. economy.

• Where: For-profit industry laboratories, Start-up businesses, Government agencies, Museums, Policy think-tanks’ Non-profit organizations

• More info: NSF 21-013
PRFB Postdoctoral Research Fellowship in Biology

• **Who:** Recent recipients of doctoral degrees (Past 15 months); US citizen or national or US permanent resident

• **What:** 3-year postdoctoral fellowship

• **Current themes:** Rules of Life, Plant Genomics, Broadening Participation

• **Where:** At any Institution of Higher Education or non-profit organization

• **When:** Application deadline is in the Fall

• **Contact:** bio-dbi-prfb@nsf.gov
PRFB Postdoctoral Research Fellowship in Biology

*Three* years of financial support

- $60,000 / year Salary
- $20,000 Research allowance

*The award:*

- **Fellowship:** Awarded to individual
- **Mentoring:** should provide active
- **Unrestricted:** No service requirement
- **Portable:** Can be used at any accredited, non-profit, US institution of higher education, with campus in US research-based master’s and doctoral degrees

Area 1: Broadening Participation of Groups Underrepresented in Biology

Area 2: Integrative Research Investigating the Rules of Life Governing Interactions Between Genomes, Environment, and Phenotype.

Area 3: Plant Genome Postdoctoral Research Fellowships
Supporting Researchers Throughout Their Career

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Core Programs

NSF

30
Core Programs
Division of Integrative and Organismal Systems
Division of Environmental Biology
Division of Molecular and Cellular Biology

• Who: Unaffiliated individuals are not eligible to submit proposals.
• What: Proposals are welcomed in all core scientific program areas supported, including projects that cross traditional disciplinary boundaries (talk to your Program Directors).
• Where: Institutions of Higher Education; Non-profit, Non-academic Organizations; Tribal Governments.
• When: Any time (in BIO)
• Amount: Create a Budget for what you need
Merit Review Criteria

• Intellectual Merit (IM): the potential to advance knowledge

• Broader Impacts (BI): the potential to benefit society and contribute to the achievement of specific, desired societal outcomes
Broader Impacts: Benefitting Society

- Teaching, training, and learning (undergrads + grad students)
- Broaden participation of underrepresented groups
- Build or enhance partnerships (internationally, or with other agencies)
- Broad dissemination to enhance scientific and technological understanding
- Enhance infrastructure (labs, equipment, + work in developing countries)
- Local impacts (policies @ state + local level)
A Proposal is Different Than a Paper

A Paper is:
1. a scholarly pursuit: individual passion, past-oriented, work that has been done
2. theme-centered: theory and thesis
3. expository rhetoric: explaining to the reader, impersonal tone, objective, dispassionate
4. individualistic: primarily a solo activity
5. few length constraints: verbosity rewarded
6. specialized terminology: “insider jargon”

A Proposal is:
1. aimed at sponsor goals: service attitude, future-oriented, work that should be done
2. project-centered: objectives and activities
3. persuasive rhetoric: ‘selling’ the reader, personal tone, conveys excitement
4. team-focused: feedback needed
5. strict length constraints: brevity rewarded
6. accessible language: easily understood

Essential Documents

Division of Environmental Biology (core programs) (DEB)

PROGRAM SOLICITATION
NSF 21-504

REPLACES DOCUMENT(S):
NSF 20-502

NATIONAL SCIENCE FOUNDATION

PROPOSAL AND AWARD POLICIES AND PROCEDURES GUIDE

General Information

Program Title:
Division of Environmental Biology (DEB) Core programs

Scope of Program:
The Division of Environmental Biology (DEB) supports research and training on evolutionary and ecological processes acting at the local, continental, and global scales. DEB supports research that advances fundamental questions in DEB's research areas in fields such as evolutionary biology, population biology, and ecological studies. The emphasis of DEB's funding priorities, in concert with other NSF-funded programs, is the study of evolutionary and ecological processes over time scales that range from generations to millions of years. DEB research is expected to engage in research that is both scientific and educational, and that expands the understanding of how the biosphere functions and provides ecosystem services to human populations.

SUMMARY OF PROGRAM REQUIREMENTS

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NSF 21-504

OMIB Control Number: 3145-0058

Effective January 30, 2023

PAPPG + Solicitation

REVISION NOTES

The definition of the Early Career and Young Investigator (ECYI) special category has been revised.

Full research proposals submitted in response to the solicitation will be reviewed in accordance with the NSF Proposal & Award Policies & Procedures Guide (PAPPG).
BIO Outreach and Blogs
BIO News and Updates

Sign-up for emails on new solicitations; events; due date reminders; and BIO’s quarterly newsletter, including information on new priorities and solicitations, highlights from the community, and more!

Visit www.nsf.gov and scroll down until you see the Sign up and social media banner, click on the yellow box, and follow the prompts.
BIO Blogs

News, features, highlights, and more from OAD and the BIO Divisions

- BIO Buzz (OAD): [https://oadblog.nsfbio.com/](https://oadblog.nsfbio.com/)
- DBInfo (DBI): [https://dbiblog.nsfbio.com/](https://dbiblog.nsfbio.com/)
- DEBrief (DEB): [https://debblog.nsfbio.com/](https://debblog.nsfbio.com/)
- IOS in Focus (IOS): [https://iosblog.nsfbio.com/](https://iosblog.nsfbio.com/)
Share your story!
#NSFstories

Join NSF in highlighting your amazing research, discoveries, innovation and more happening across the country and around the world.

- Tag your location and use our IG filter, graphics or simply post a photo or video with #NSFstories

- We will amplify your posts and share your stories. We will also share your stories at events, hold competitions, feature on our blog and more!

Toolkit: nsf.gov/ScienceHappensHere
Supporting Researchers Throughout Their Career

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Molecular & Cellular Biosciences (MCB)
Genetic Mechanisms Steve DiFazio
Questions?