Approximately 700 Rensselaer students participate in the Undergraduate Research Program (URP) each year. The URP is open to all students. Students can work with a faculty member to identify their own research project, or join an ongoing research project. These research experiences are designed to provide students with a career development opportunity and a real-world research experience.

**UNDERGRADUATE RESEARCH PROGRAM**

The Undergraduate Research Program helps students identify a research project during the academic year. Students may pursue research for academic credit, as a paid research assistant, or for the experience of working in the labs of world-leading Rensselaer faculty researchers. The Office of Undergraduate Education matches the funds a paid research assistant receives from a sponsoring department or faculty member. Students can participate for one semester or the entire academic year.

**SUMMER UNDERGRADUATE RESEARCH PROGRAM**

The Summer Undergraduate Research Program (SURP) is an exciting opportunity that allows students to spend 10 weeks immersed in leading-edge research with a faculty mentor. Application to this program begins with the submission of a research proposal that is competitively reviewed by a panel of faculty members. SURP students receive a competitive research stipend and work full time on an independent project within an active research group.

**ADDITIONAL FUNDED RESEARCH OPPORTUNITIES**

In addition to the URP and SURP programs, Rensselaer offers many other undergraduate research opportunities. With the help of faculty members, students secure external funding to pursue research in their field of interest. Additionally, grants awarded to faculty members often include a dedicated budget to support undergraduate research. Rensselaer’s research centers also engage undergraduates in both formal and informal research experiences.

Our faculty members enjoy connecting students with summer research opportunities at other universities, federal laboratories around the country, and select international research venues.

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Examples of undergraduate research at Rensselaer include:

- **Developing** non-invasive methods to deliver drugs to the brain that circumvent the natural blood brain barrier.
- **Working** with the Smart Lighting Research Center to develop new and more efficient lighting technologies.
- **Collaborating** on projects in earthquake engineering that complete seismic analysis and design methodologies that mitigate the negative impact of earthquakes on buildings, bridges, and pipelines.
- **Understanding** the fundamental mechanisms of disease, from Alzheimer’s and diabetes to cancer.
- **Converting** cargo containers into living space to help alleviate housing shortages for Haitian orphans whose residences were destroyed by earthquake activities.
- **Refining** an online learning game for children to teach them how to speak Mandarin Chinese, making use of modern gaming methodology in a cartoon format.
- **Developing** new approaches to networking, advanced visualization, sensor design, and haptics.
- **Exploring** renewable technologies, energy efficiency, and understanding of global environmental change to preserve the bio-diversity of the planet.

UNDERGRADUATE RESEARCH CONFERENCES AND PUBLICATIONS

As an undergraduate researcher, you have the opportunity to showcase your research findings to faculty and peers in a professional setting at the annual undergraduate research symposium at Rensselaer. Students gain experience presenting their research either as a poster or as an oral presentation. Awards are given to the best posters and presentations.

Rensselaer strongly encourages students to build their resumes by seeking out opportunities to present their papers at national conferences, or by co-authoring expanded articles with faculty mentors for publication in research journals. Funding for travel is often available.

For more information, please contact:

Office of Undergraduate Education
4010 Walker Lab
Rensselaer Polytechnic Institute
Troy, NY 12180-3590

Phone: (518) 276-2244
Fax: (518) 276-8062
Email: undergradresearch@rpi.edu

undergrad.rpi.edu

RESEARCH EXAMPLES

Examples of undergraduate research at Rensselaer include:

- Christina Fiaschetti and Joe Kalina, Chemical Engineering
  Faculty Adviser: Robert Linhardt
  Bioreactor Design for Heparin Synthesis
  Heparin is used extensively as an anticoagulant. Currently heparin is obtained from animals and can be contaminated. A synthetic alternative has been developed at Rensselaer, eliminating the danger of contamination. Fiaschetti grew and harvested enzymes in large quantities for use in heparin synthesis and was involved with bioreactor design.

- Patrick Gilmartin, Civil Engineering
  Faculty Adviser: Victoria Bennett
  Levee Monitoring on a Local and Global Scale
  The frequency and intensity of storms is increasing. In key parts of the country, monitoring of levees and other flood control systems needs to be improved. This project is seeking a high-tech solution to continuously assess the health of levee systems on both a global and local scale. Gilmartin’s family has been impacted by recent storms, and he is taking the opportunity to help solve the problem.

- Ashley Clough, Biomedical Engineering
  Faculty Adviser: Eric Ledet
  Surgical Instrumentation for Spinal Fusion Surgery
  This research is seeking to optimize the surgical implants used during spinal fusion surgery. During surgery, an anterior cervical plate is placed in the spine to provide stability during healing. By modifying the stiffness of the implant through design, it may be possible to improve healing time. This hypothesis is being tested in vitro (outside the body) via finite element modeling and mechanical testing of prototype plates.

- Brendan Anzures, Geology
  Faculty Adviser: Heather Watson
  The Formation of Earth’s Core
  This research studies the microstructure Fe-S and Fe-Si alloys in a silicate rock matrix at high pressures and temperatures. 3-D visualization and modeling of the experimental results can then be used to understand the timing and conditions of planetary core formation.

UNDERGRADUATE RESEARCH SNAPSHOTS

- Eyelvin Hinomosa, Biology
  Faculty Adviser: Brett Fajen
  Visual Control of Locomotion
  This project is focused on the visual control of locomotion with the goal of better understanding how people utilize visual information to walk over a complex terrain in a safe and energetically efficient manner. The research provides a foundation for anticipating the complex behavioral consequences of impairments that affect locomotion, and inspiring new ideas about how to design legged robots to navigate complex environments.

- Dylan Bryon, Psychology
  Faculty Adviser: Brett Fajen
  Augmented Reality Usability for Museums/Cultural Heritage
  In this project, a mobile augmented reality application called “Below Stairs” is used to enhance the experience visitors have at the 1850s Hart-Ouett house in downtown Troy. Visitors experience a historic event, a Winter Ball, that took place in the house by playing the part of a new servant working there on a trial day. This project will design and carry out multiple usability evaluations in order to inform the iterative design process used to create the application.

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