Every year, the Office of Undergraduate Education sponsors about 600 students participating in the Undergraduate Research Program (URP) at Rensselaer. The URP is open to all students. Whether the choice is to join and augment an ongoing research project, or to seek faculty guidance in pursuit of research ideas, the URP provides students with the opportunity to make research an integral part of their Rensselaer undergraduate education.

UNDERGRADUATE RESEARCH PROGRAM (URP)
The Undergraduate Research Program (URP) at Rensselaer is in place to help students identify and facilitate research opportunities. Under the URP, students may pursue research for academic credit, as a paid assistant in a research project, or for the experience of working in the labs of world-leading Rensselaer faculty researchers. As a paid assistant, the Office of Undergraduate Education provides matching funds for students who receive a stipend from a sponsoring department or faculty member. URP opportunities are available during the academic year.

SUMMER UNDERGRADUATE RESEARCH PROGRAM (SURP)
The Summer Undergraduate Research Program (SURP) is a unique, exciting opportunity for students to spend the summer months immersed in leading-edge research with their faculty advisor. Application to the 10-week, full-time program begins with the submission of a research proposal that is competitively reviewed by a panel of faculty members. Geared for more seasoned undergraduate researchers, SURP includes a research stipend for students and is a rich, sustained research experience that will be a memorable and rewarding component of the academic career.

ADDITIONAL FUNDED RESEARCH OPPORTUNITIES
There are many other undergraduate research opportunities at Rensselaer. With the help of faculty members, many students secure external funding to pursue research opportunities in their field of interest. Additionally, grants and other funding awarded to faculty members often include a dedicated budget to support undergraduate research experiences. Many different research centers at Rensselaer also regularly engage undergraduate researchers during the academic year and in the summer months.

The Office of Undergraduate Education and faculty researchers can also assist students in identifying summer research opportunities at federal laboratories around the country, or international research internships around the globe.
Examples of Undergraduate Research at Rensselaer include:

- **Learning** advanced cell biology and biochemistry techniques with an eye to developing new ways of fighting cancer
- **Developing** specialized diagnostic and testing equipment for Olympic swimming and skeleton athletes
- **Designing** and installing a solar power and battery backup system for a rural school in Haiti
- **Creating** a new data visualization and projection system that transforms a room into an immersive, interactive, three-dimensional digital display
- **Contributing** to an open-source, distributed-computing program that aims to map the Milky Way Galaxy
- **Working** on behavior recognition software to track the movement of individuals over a distributed network of cameras
- **Studying** and mitigating zebra mussel infestations in upstate New York lakes

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**UNDERGRADUATE RESEARCH CONFERENCES AND PUBLICATIONS**

As undergraduate researchers, students have the opportunity to showcase their research findings to faculty and peers in a professional setting at the annual undergraduate research conference at Rensselaer. Students may submit papers to be assessed by a panel of faculty members, and many prizes are awarded.

Rensselaer encourages all students to seek out opportunities for presenting these papers at national conferences, or to co-author expanded articles with faculty mentors for publication in research journals.

Another venue for highlighting student work is the Rensselaer Undergraduate Research Journal (RURJ). Set to launch in fall 2010, the new journal is a peer-reviewed publication that offers students visibility and recognition across the Rensselaer campus and all of academia.

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E-mail: undergradresearch@rpi.edu

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**UNDERGRADUATE RESEARCH SNAPSHOTs**

- **Christian Bosoy**
  Chemical Engineering
  Faculty Advisor: Shekhar Garde
  Engineering of Water-Mediated Interactions for the Design of Molecules that Fold into Unique Three-Dimensional Structures
  Proteins are linear heteropolymers of amino acids that fold into unique and functional three-dimensional structures in water. Bosoy’s research focuses on using state-of-the-art molecular simulation techniques to design model heteropolymers that display protein-like properties. His study explored the use of Coulomb non-covalent molecular staples to stabilize beta-turn structures of polymers in water.

- **Erin McAuley**
  Bioinformatics and Molecular Biology
  Faculty Advisors: David Corr and George Plopper
  Precise Patternin of Human Mesenchymal Stem Cells to Investigate Spatial Dependence on Commitment
  McAuley’s research into developing a laser-based direct write system (MAPLE DW) aims to demonstrate precise patterning of mesenchymal stem cells into specific geometric configurations. The tool enables an investigation of the effects of cell communication on the differentiation of human mesenchymal stem cells into osteoblasts or adipose tissue.

- **Cory Crean**
  Mechanical Engineering
  Faculty Advisor: Kurt Anderson
  Computational Multibody Dynamics
  Multibody methods can be used to model, simulate, and analyze complex behavior in mechanical and biological systems. Crean helped develop rules to adaptively identify the underlying dynamics formulations and associated numerical algorithms for a chosen model to yield an optimal combination of accuracy and simulation speed. This research has important applications in the areas of industrial robots, musculoskeletal systems, and protein structure dynamics.

- **Karen Cedeno**
  Chemistry
  Faculty Advisor: Susan P. Gilbert
  The Effects of Removal of C termini of Tubulin for Mitotic Kinesin
  CENP-E is a nanoscale molecular motor that has the ability to convert the chemical energy of ATP turnover into force to generate movement along microtubules. In her research, Cedeno has helped to reveal that domains on the mitotic spindle microtubules interact with CENP-E to ensure chromosome movement to the metaphase plate for accurate chromosome segregation during cell division.

- **Lauren Canova**
  Biology
  Faculty Advisor: Robert J. Linhardt
  Heparinase Stability
  Mucopolysaccharidoses are metabolic disorders affecting thousands of individuals. Hospitals require the enzyme heparinase to properly diagnose and treat these patients. Heparinase is very unstable, and the goal of Canova’s research is to find ways to stabilize heparinase for shipping.

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