REQUEST FOR PROPOSALS

Junior/Senior Engineering Clinic
Entrepreneurial Development Projects

Director:
Tom Merrill, Ph.D.
merrill@rowan.edu
856-256-5343

Summary
A series of grants have been awarded to Junior/Senior Engineering Clinic from the National Collegiate Innovators and Inventors Alliance (NCIIA) and private donors to create the Rowan Undergraduate Venture Capital Fund to promote rapid development of original student inventions. Proposals are requested from multidisciplinary student teams for planning and implementing an original, semester-long product development enterprise. Funding of up to $2500 per team will be competitively awarded based on the student-generated proposals. To be funded, a student team must be multidisciplinary, including engineering students from at least two disciplines. In addition to an engineering faculty project director, each team should select an advisor from local industry and plan to work with Rowan Center for Innovation and Entrepreneurship to develop a business. The team must propose an original product idea (and associated business opportunity) that can be successfully designed, developed and prototyped in a single semester.

Table 1. Overview of course content in the 8-semester Engineering Clinic sequence.

<table>
<thead>
<tr>
<th>Year</th>
<th>Clinic Theme (Fall)</th>
<th>Clinic Theme (Spring)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frosh</td>
<td>Engineering Measurements</td>
<td>Competitive Assessment Lab</td>
</tr>
<tr>
<td>Soph</td>
<td>Design and Writing</td>
<td>Design and Public Speaking</td>
</tr>
<tr>
<td>Junior</td>
<td>Multidisciplinary Design Project</td>
<td>Multidisciplinary Design Project</td>
</tr>
<tr>
<td>Senior</td>
<td>Multidisciplinary Capstone Design Project</td>
<td></td>
</tr>
</tbody>
</table>

Introduction: The Engineering Clinic
In 1992, the local industrialist Henry M. Rowan made a generous donation to the then Glassboro State College in order to establish a high-quality engineering school in southern New Jersey. This gift has enabled the university to create one of the most innovative and forward-looking engineering programs in the country. The College of Engineering at Rowan University is composed of four departments: Chemical Engineering; Civil Engineering; Electrical Engineering; and Mechanical Engineering. Each department has been designed to serve 25 to 30 students per year, resulting in 100 to 120 students per year in the College of Engineering. The size of the college has been optimized such that it is large enough to provide specialization in separate and credible departments, yet small enough to permit the creation of a truly multidisciplinary curriculum in which laboratory/design courses are offered simul-
taneously to all engineering students in all four disciplines. Indeed, the hallmark of the engineering program at Rowan University is the interdisciplinary, project-oriented Engineering Clinic sequence.

The Engineering Clinic is a course that is taken each semester by every engineering student at Rowan University. In the Engineering Clinic, which is based on the medical school model, students and faculty from all four engineering departments work side-by-side on laboratory experiments, design projects, applied research and product development. Table 1 contains an overview of course content in the 8-semester engineering clinic sequence. As shown in the table, while each clinic course has a specific theme, the underlying concept of engineering design pervades throughout.

The 4-year Engineering Clinic sequence offers students the opportunity to incrementally learn the science and art of design by continuously applying the technical skills they have obtained in traditional coursework. This just-in-time approach to engineering design education enables students to complete ambitious design projects as early as the sophomore year. And, by the junior year, students are well equipped to embark on a completely original, entrepreneurial enterprise. This proposal describes an innovative venture capital system that will allow students to competitively apply for funding opportunities to embark on such an enterprise.

Available Resources

The engineering clinic has quickly gained national attention and two separate NSF grants have been awarded to create a unique set of resources that will enable undergraduate students to engage in original and rapid product development. The Competitive Assessment Laboratory (NSF DUE-9850563) will feature dedicated test stations for the complete engineering assessment of consumer products. Stereolithography: A Distributed Partnership (NSF DUE-9751651) has created a rapid prototyping center featuring a 3-D systems SLA-250 stereolithography machine, Stratasys Dimension BST 3-D printer, and a QuickCircuit rapid circuit prototyping machine. In addition to the externally funded projects described above, the College of Engineering has a fabrication facility featuring advanced CNC (milling, turning, punch) and manual machine tools. These facilities will be available for use on the proposed projects.

Project Incubator Space

Space is available for startup business opportunities in the new Technology Business Hatchery in Memorial Hall and the South Jersey Technology Park: http://www.sjtechpark.org/. Please contact Dr. Merrill for further details.
A Previous Example of a Funded Project

Although there have been countless innovations in equipment for snowboarders, the student E-Team recognized a need for modifying chair lift designs to accommodate snowboarders. The need to modify existing chair lifts is a major concern for the ever growing population of snowboarders, who unanimously find the current lift designs uncomfortable. The system that the student E-team has designed will solve this problem, making the long ride up the mountain dramatically more enjoyable for snowboarders, as well as solving several other secondary problems associated with snowboarding. The product is called the SnoRhino™ (Patent Pending). The student team has formed a company called UpHill Enterprises (www.snorhino.com), which is in the process of marketing the SnoRhino directly to ski resort owners. The team has strong evidence of high demand from a market study of snowboarders.

Figure 1. Advertisement for the SnoRhino.

The SnoRhino was invented by Rowan Engineering students Jeff Gladnick '03, Matt Eberhardt '03 and Pete Boyle '03 and development was initially funded from the UVCF during the Fall 2001 semester. The group has recently received an additional Advanced E-Team grant directly from the National Collegiate Inventors and Innovators Alliance. In recent years, 5 Rowan teams have received Advanced E-Team grants from NCIIA to continue their technology business ventures ranging from $8500 to 14,000.

The Venture Capital Fund for Junior/Senior Engineering Clinic

This semester, the Junior/Senior Engineering Clinic will, once again, feature a mixture of projects funded by industry and faculty research interests. Clearly, projects such as these are central to developing the design and problem solving skills that are lacking in the typical engineering curriculum. What is often missing, however, in the industry and faculty-created design projects, is the spirit of invention, innovation and entrepreneurship. One way to promote the spirit of entrepreneurship by providing students with the opportunity to propose their own original enterprises. Accordingly, a series of grants has been awarded by the NCIIA and private donors
to create a venture capital fund, specifically ear-marked for the development of original products by student teams within the Junior Engineering Clinic.

Proposal Requirements

Funding of up to $2500 for student teams will be competitively awarded based on student-generated proposals to the venture capital fund. To be funded, a student team proposal must describe an enterprise that meets the following criteria:

1. The team must be multidisciplinary, including engineering students from at least two disciplines.
2. The team must appoint a project director from the College of Engineering, an advisor from industry and, if possible, enroll in the New Venture Development course in the College of Business. Your engineering advisor must be contacted prior to submitting the proposal and he/she must agree to be your advisor.
3. The enterprise must involve an original product idea that can be successfully designed, developed and prototyped in a single semester.
4. The team must clearly identify the business opportunity associated with their product idea.

The Junior/Senior Engineering Clinic is taken by a total of approximately 200 students distributed equally from each of the four engineering disciplines. However, all of the students will not embark on the entrepreneurial endeavor described above. The competitive proposal process, which will reward only those with original and thoroughly planned ideas, will require a significant effort at the start of the semester.

Proposal Instructions

The proposal must include the following:

1. Letter of transmittal: Address the letter to the project director.
2. Title page: Include a name for the invention and the names and contact information of all team members.
3. Main Body: (Not to exceed 5 pages, single spaced).
   a. Abstract: Provide a brief summary of the proposed invention.
   b. Introduction: Discuss the perceived need and how your invention satisfies this need. Describe how your invention will it impact society and/or why anyone would want to buy it.
   c. Prior Art: A patent search must be performed. List all relevant patents and describe how your invention is unique with respect to the prior art. Patents can be included in the appendices.
d. *Description of the invention.* Provide a description of the invention. Include several possible embodiments of the invention.

e. *Prototype development.* Discuss the resources necessary and a schedule for development of the prototype.

4. Management Plan (Not to exceed 1 page). Provide a corporate structure for your team and assign responsibilities for each team member. Include the names and contact information for your engineering faculty advisor and industrial advisors. Provide a schedule of activities required for successful development of the prototype. Include a Gantt chart.

5. Budget Justification. (Not to exceed 1 page.) Provide a narrative which justifies the requested budget.

6. Budget Summary. A list of how the budget will be spent.

7. Project Personnel. Provide a resume for each team member.