New bioprocessing course has research ‘a-peel’

When life gives you lemons, you make...an anti-cancer drug?

Or so says Byron Wingerd, a biochemistry graduate student who is enrolled in CHE 491, Multidisciplinary Bioprocessing Laboratory. According to Wingerd, lemon skins are a great source of 95%-pure limonene oil, a substance that is similar to perillyl alcohol, which, in turn, has uses as an anti-cancer drug.

"So, if you had a bio-process that used bacteria to convert limonene into perillyl alcohol inexpensively, you would have a great application for it," Wingerd asserts.

Wingerd is one of eleven pioneering students who have enrolled in the new bioprocessing course this semester. Mark Worden, chemical engineering professor and the course coordinator, explains that the new course was developed as part of the National Science Foundation (NSF) Combined Research-Curriculum Development (CRCD) program. The initiative emphasizes educating both undergraduate- and graduate-level students together on new research technologies.

"Our course, which is running for the first time this semester, goes a little further than just putting together both graduate and undergraduate students," says Worden. "In this class, students from a variety of backgrounds and majors work in teams and go into the labs of participating faculty members."

"We are trying to develop new teaching ideas that formalize the training that engineers, microbiologists, or chemists get on how to work together in teams."

—M. Worden

Students in Worden’s class are placed in teams without regard to their majors, which range from chemical engineering to botany and plant pathology to microbiology. These student teams work with faculty members who are involved in the class and who act as group mentors. The participating faculty then help teach team members laboratory and research skills.

"For instance, a group of three students may go into Dr. Oriole’s lab and learn how to do cloning and carry out permutations in a reactor," explains Worden. "Engineers would not usually learn cloning and microbiologists would not typically learn how to set up a reactor to grow cells."

Prashant Srivastava, a participant in the course, says that he enjoys the class work and learns new things from his own classmates everyday. Says Srivastava, "You learn to listen more and speak less when you are working with people from other majors. That way you both can learn a lot more from each other."

Worden agrees with Srivastava in that the class helps to break down the barriers that people encounter when working together in multidisciplinary teams. That, in essence, is what the course objective is, he says. "We are trying to develop new teaching ideas that formalize the training that engineers, microbiologists, or chemists get on how to work together in teams."

Worden says that even though students may never use the laboratory skills that they pick up in the course, they will benefit from the "people skills" they learn by working in multidisciplinary teams. And, he notes, the idea of multidisciplinary teams is strongly supported by both industry and the university. "Many corporations are interested in hiring students that have experience working with people outside their major," he says.

MSU already offers several cross-disciplinary courses in science and agriculture, which have helped them develop a reputation as a scientific leader, says Worden. "The foresight that MSU is demonstrating in continuing to support cross-disciplinary work will prime them to be on the cutting edge in the future," Worden declares.
MSU Chemical Engineering Junior Named a Goldwater Scholar

If someone had asked Jason Fuller as a freshman what he thought his chances were of winning one of the most prestigious scholarships in the country, the modest young man would have laughed and replied, "Only once in a blue moon would that ever happen."

Ironically, that's exactly what Fuller saw—the second full moon of the month, or a "blue" moon—on the evening of March 31 after he received word that he had been awarded the Goldwater Scholarship. The Goldwater Scholarship, created to pay tribute to the late Senator Barry M. Goldwater, is the premier undergraduate award in the nation for students pursuing careers in science, engineering, and mathematics.

"It's just surprising what's happened," says Fuller, who says that he never felt that he was very gifted academically. "In fact, I came [to MSU] with a lot of fear that I was going to have a hard time making it through."

Fuller, a chemical engineering student from Caro, Michigan, attributes his academic successes to sheer determination and his willingness to take advantage of opportunities that were presented to him. He credits his cooperative engineering education experience with 3M and his undergraduate research experience in Carl Lira's lab with giving him the practical background it takes to excel. Fuller studied the most effective methods for isolating benzaldehyde, the natural cherry flavoring found in cherry pits, as an independent study in Lira's laboratory.

"There is a certain level of satisfaction that researchers feel throughout the process of scientific discovery—an excitement in learning," says Carl Lira, associate professor of chemical engineering.

"Jason has that. Jason really wants to understand, and he is willing to put in the sweat equity to do so."

"It is a pleasure to see his accomplishments recognized with this award," Lira adds with a note of pride.

On March 31, the Environmental Engineering Student Society (EESS) invited several local girl scout troops to visit MSU.

EESS members conducted brief learning sessions for the girl scouts, visually demonstrating such difficult-to-grasp concepts as soil erosion, acid rain, reflection and refraction, and the hydrologic cycle. The culmination of the day was when—after performing experiments, watching videos, and helping out in demonstrations—the scouts were awarded their water badge.
Donald Anderson, MSU chemical engineering professor emeritus, started a joint chemical engineering seminar series more than 20 years ago between Michigan State University and the University of Michigan. Now, the joint seminar series, considered by many to be the longest-running in the Big Ten, finally has an official name: Caeruleum-Viridis. Caeruleum-Viridis is Latin for the colors blue and green, according to MSU’s new seminar series coordinator, Charles Petty, professor of chemical engineering.

Petty recalls that originally, the series was held in Howell, Michigan, because it was considered “neutral territory” between the two normally rival schools. Now, each university takes turns hosting the seminar series on their own campus. Both schools also fund the keynote speaker each year, drawing some of the bigger names in chemical engineering.

The speaker for this year’s series, held March 18, was L. E. Scriven from the University of Minnesota. Scriven’s topic, “Liquid is Readily Coated, but Coatings Cannot be Liquid,” was deemed quite amusing by seminar participants.

In addition to the new name, another tradition was added this year. A plaque will be displayed at both universities that will list the name of the main speaker from this year on.

University of Michigan Vennema Professor Scott Fogler, the co-coordinator of the series, says that he is impressed by MSU’s plaque gesture and is looking forward to future seminars.

Parviz Soroshian, civil and environmental engineering professor, was elected Fellow of the American Concrete Institute.

Soroshian is the director of the Concrete Technology Laboratory here at the university. His research emphasizes the improvement of concrete composite durability. He has also worked to improve the performance of concrete in infrastructure applications by using fiber reinforcements and recycled materials.

Regina Zmich, ROSES coordinator and academic adviser, was recognized as the Outstanding State Division Leader for 1998 by the American College Personnel Association (ACPA). Zmich received her award during the ACPA annual convention held in Atlanta, Georgia, this March. Zmich is the former president of the Michigan College Personnel Association (MCPA).

Robert VonBernuth, biosystems engineering professor, was honored by the College of Agriculture and Natural Resources Alumni Association. VonBernuth was given the 1998 Distinguished Faculty Award at their annual Dean’s Luncheon. VonBernuth has performed extensive research on manure management, odor mitigation, and nutrient balance to improve the environment on and around farms. He is also the director of the animal waste management program at the university.

Robert Soutas-Little, professor of materials science and mechanics, has co-authored two engineering textbooks with Daniel Inman, a faculty member at Virginia Polytechnic Institute and State University. The texts, entitled, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, each come with supplemental software guides. The supplements demonstrate how to use MATLAB, Mathcad, Maple, or Mathematica to solve mechanics problems found in the books.

By integrating computational software into the courses, Soutas-Little says that students are better able to learn the fundamentals of mechanics as well as design concepts. He explains that although the principles of mechanics have not changed, the tools that engineers use to solve mechanics problems have evolved with today’s computer technology. Soutas-Little hopes to reform mechanics instruction in university classrooms by presenting students with both basic engineering principles and problem-solving tools.

The textbooks are available through Prentice Hall.
**Grants Received**

Dale, B. (ChE)  
*Predicting Biomass Digestibility*  
Michigan Biotechnology Institute  
01/01/99-12/31/99 $31,050

McGrath, J. (ME)  
*SGER: GFP-Based Imaging for Cryobiological Research: A Cryosurgical Application*  
NSF  
03/01/99-02/29/00 $59,257

Miller, D. (ChE)  
*Condensed-phase Catalytic Hydrogenation of Crop-derived Organic Acids*  
Cargill Hybrid Seeds  
09/01/98-08/03/00 $25,000

Miller, D. (ChE)  
*Liquid-phase Catalytic Hydrogenation of Biomass-derived Organic Acids*  
Consortium for Plant Biotechnology Research  
01/01/99-12/31/99 $20,000

Miller, D. (ChE)  
*Catalytic Upgrading of Corn Fiber to Ethylene and Propylene Glycol*  
National Corn Growers Association  
02/25/99-02/24/00 $102,134

Nyquist, D (ECE), Rothwell, E. (ECE), Chen, K. (ECE)  
*Muti-spectral Low Observable (LO) Nondestructive Evaluation (NDE) Research*  
Boeing  
08/31/98-12/31/99 $49,797

Rover, D. (ECE)  
*CAREER—Integration of Systems Performance: Tools and Technologies in Research and Education*  
NSF  
06/01/99-05/31/00 $50,000

Schock, H. (ME)  
*Experimental and Numerical Evaluation of Fuel-Air Mixing and Performance of Alcohol-fueled Two- and Four-stroke Direct Injection Stratified Charge Engines*  
Environmental Protection Agency  
01/01/99-12/31/99 $389,858

Shih, T. (ME)  
*Development and Implementation of a Global Bleed Boundary Condition*  
NASA  
01/21/99-01/20/00 $60,000

Sticklen, J. (CSE)  
*Conceptual Process Design for Re-engineering Metal Assemblies for Composite Material*  
US Navy  
05/01/96-12/31/99 $68,000

Taylor, W. (CEE)  
*Determination of Ground Truth Accuracy of Traffic Sensors*  
Jet Propulsion Laboratory  
07/01/98-01/31/99 $3,000

**Proposals Submitted**

Benard, A. (ME)  
*Investigations of Solidification Processes with Convection Using Meshless Methods and Quantitative Experimental Verification*  
NASA $613,433

Buch, N. (CEE)  
*A Study of Materials-related Distress (MRD) in Michigan's PCC Pavements—Phase 2*  
MTU (MDOT Prime) $115,014

Jain, A. (CSE)  
*Image Tiling for High Resolution Solid Surface Profiling*  
NASA Lewis $34,999

Lee, A. (MSM)  
*Rheological Characterizations of Hybrid Thermoset Resins*  
Air Force Research Lab $15,000

Owen, C. (CSE)  
*Misuse of E-commerce Systems: Development of an Educational and Research Infrastructure for Social Scientists*  
Rutgers (NSF Prime) $278,914

Rothwell, E. (ECE)  
*Self-structuring Antenna Systems*  
DARPA $663,418

Sisiopiku, V. (CEE)  
*Dynamic Traffic Forecasting Models for Advanced Traveler Information Systems Applications*  
Transportation Board $99,240

Subramanian, K. (MSM), Bieler, T. (MSM), Lucas, J. (MSM)  
*Effects of Nickel and Copper Additions on Microstructure and Thermo-mechanical Behavior of Tin-Silver Solder*  
Visteon Automotive Systems $45,904

Weng, J. (CSE), Stockman, I. (Audiology)  
*Workshop on Development and Learning*  
NSF $30,000

Weng, J. (CSE)  
*Hierarchical Discriminant Regression for Image-based Classification and Regression*  
NSF $248,558

**Events Readers:**

Please send news and information for the newsletter to Jill Krueger at Events@egr.msu.edu or via snail mail to room 3412 Engineering Building, East Lansing, MI 48824-1226.  
—Thank you!