

Internal Audit: letting the sun shine in

Michigan Tech has dozens of areas and departments, not to mention hundreds of accounts, and in practice, we all operate pretty independently. Managers have quite a bit of leeway in how they spend their budgets, and this generally works pretty well.

But in reality, our money is not our money. We are trustees only, spending our budgets on behalf of the taxpayers of Michigan, who monitor us through their representative body, the MTU Board of Control. We also have to follow University policies and procedures, abide by state and federal laws, and are expected to follow generally accepted accounting practices.

You may have noticed, however, that Board of Control members do not stop by your office on any regular basis to check out your operations. That job falls to their agents, the staff of Internal Audit.

Internal Audit conducts several specific audits annually in areas such as room-and-board revenue and employee tuition waivers. In addition, they may perform audits in any University area.

As a public institution, Michigan Tech is subject to the Freedom of Information Act, so most University records are open to anyone, including information on our salaries. Internal Audit has even more access than the general public. They can look at any record, anytime, particularly financial records and records dealing with the control of supplies and property. For instance, they could audit Payroll Services to make sure employees are receiving the right salaries and wages. However, the auditors are required to keep all the information they gather completely confidential.

You may not even know if an audit involves records generated by your department. The auditors

typically look at purchase orders, check requests, time sheets, cash register sheets, vendor payments, etc. They also check out computer records to make sure that the data being held in the University's computer system is accurate and secure.

For the most part, audits are painless and can help you improve your operations. When an audit is finished, Internal Audit issues a report to the relevant manager, all University officers, and the Board of Control. In addition to the audit's objectives and conclusions, the auditors will also give recommendations for improvement, so departments will know what to do to fix any problems. But no one is expected to revamp their system overnight; follow-up reviews are held within six months and the department's improvements are then reported to the Board of Control.

If you have any questions on accounting policies or control procedures in your department, Internal Audit is happy to help. Their office also occasionally receives reports from MTU employees who are concerned about certain operations in their departments. All such reports are held in the strictest confidence, as is the identity of the concerned employee. Sometimes concerns are submitted anonymously through campus mail, but anyone doing this should be sure to give enough information to allow for an adequate follow-up by the Internal Audit staff.

Internal Audit includes Director **Amy Hughes**, Auditor **Sharon Haapala**, and three student interns, **Paula Dillon**, **Teresa Harper**, and **Jessica Zerbst**. They report to the Board of Control through **Dale Tahtinen**, secretary of the Board of Control and vice president for government relations.

Women's history bulletin board contest

The Presidential Commission for Women is sponsoring a bulletin board display contest in honor of Women's History Month.

The contest is open to all individuals and groups on campus. Displays will be judged on their educational value, creativity, design quality, and clarity, consistency, and significance of theme.

The top four winners will receive cash prizes: two \$100 awards and two \$50 awards will be given.

To enter, pick up a form at the Office of Student Affairs, Educational Opportunity, or any residence hall desk. The entry deadline is March 16. Judging is March 20, and awards will be announced during the opening day of the Women's Reading Room in the Memorial Union, March 30.

For more information, contact Patricia Sotirin (487-3263, pjsotiri@mtu.edu) or Educational Opportunity (487-3539).

Seminar April 2

The accidental thief: copyright infringement on the Net

A live videoconference, "Am I a Crook? Copyright Issues on the Internet," will be shown on Thursday, April 2, at 2:30-4:00 p.m. in EERC B11.

If you use or plan to use the Internet in instruction—particularly if you are creating or teaching an online course—you need to be informed. Tune in with your colleagues on April 2 for a clear explanation of the facts.

Armed with the facts, it's possible to make a reasonable, informed judgment about fair use online without being an expert in copyright law. This convenient faculty development event will

- provide examples of legal and illegal uses of copyrighted material
- illustrate potential issues and problems
- clarify what kinds of material can and cannot be taken in fair use
- discuss how much of a piece can be used in an online course

This program is sponsored by the College of Engineering, the College of Sciences and Arts, the Library, and the Vice Provost for Instruction. To reserve a seat, contact Dave Chard in Educational Technology Services at dmchard@mtu.edu or 487-2299. For more information, visit this Web site: <http://www.pbs.org/learn/als/programs/live/crook/index.html>

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*Wisdom comes
on soft shoes.*

—J. S. Hifler

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Broadcasting internship available

MTU students who are interested in a career in broadcast journalism are invited to apply for the Radio and Television News Directors Foundation 1998 Jane Pauley Internship.

The six-month internship will be at WISH-TV in Indianapolis beginning July 1 and pays \$1,120 per month. Candidates can be graduate students or undergraduates with sophomore standing or higher. The internship is limited to students who are not majoring in journalism but who are pursuing a career in electronic journalism.

The application deadline is March 20. To apply, get an application from Research Services or visit <http://www.rtndf.org>

Proposals in progress

Researchers, their proposals, and their potential sponsors are

- **John Gierke, Alex Mayer, and Jim Diehl** (geological engineering and sciences), "Graduate Assistance in Areas of National Need: PhD in Geological Engineering," Department of Education
- **Michael Roggemann** (electrical engineering), "Scintillation Control for Adaptive Optical Sensor," AFOSR
- **Judith Perlinger and Noel Urban** (civil and environmental engineering), "Biogeochemical Controls on Reductive Transformation Rates: A Framework," NSF

TECH TOPICS

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Information to be included in *Tech Topics* should be submitted to the *Tech Topics* editor in one of the following ways:

- By e-mail to ttopics@mtu.edu
- By campus mail, send typed copies to *Tech Topics*, University Relations.

Each week, the deadline for submitting information is **Friday at 5:00 p.m.** for publication the following Friday.

Our URL is <http://www.sas.it.mtu.edu/urel/ttopics/index.html>

Center for Teaching, Learning, and Faculty Development



Another essay in the volume *Inspiring Teaching: Carnegie Professors of the Year Speak* is

entitled "Classroom

Atmosphere: A Personal Inventory," by Harvey Blankespoor, professor of biology at Hope College. In this essay, Blankespoor unveils some of the biases that he carries into the classroom and how he attempts to deal with them. Over his years of teaching, he says, he has learned to focus less on the class as a whole and more on the individuals that make up the class. He suggests that we must be careful with the baggage that we almost inevitably carry into the classroom, which affects our ability to connect with each of our students. Baggage, in Blankespoor's view is any behavioral tendency or value judgment that we consciously or unconsciously bring to the classroom. To this end, he suggests that we must

- be careful not to favor our attention on the best students. This observation hit home with me, as I realize that I often engage the students who are eager to answer the questions, and it is these students that I will often engage in continued dialogue in the class. Although it is gratifying to have students give the right answer to our questions (reinforcing the notion that we are really accomplishing something with our lessons), we must reach out to engage the reticent or under-achieving student. In truth, they are in greater need of our attention and concern.
- be careful not to give disproportionate attention to students of one gender, race, or nationality. Clearly, any such tendency is frustrating and discouraging to the students, who perceive that they are excluded from the interaction. Blankespoor says that early on in his career he felt reluctant to engage students of different racial backgrounds in class, fearing that he would do more harm than good by saying or doing the "wrong" thing. He has come to realize that excluding these students from his attention is worse than any unintentional faux pas that he might have made in reaching out to include them. Now, he says, he and his wife encourage structured contact with minority, international,

Professional biases and inspiring teaching

By William Kennedy, director

as well as majority students to make them feel that each of them matter as individuals and that they are all a part of an active and engaging university learning community.

- be careful not to telegraph our preference for interacting with upper-level students to freshmen classes that we might teach. It may be more pleasing and rewarding to interact at higher levels with students who are more articulate and conversant with our disciplines, but beginning students are probably more in need of our care and attention.

Blankespoor and his wife regularly invite small groups of students to their home to "meet his family, to eat, to participate in games, and to talk about upcoming exams." In addition to these home visits, Blankespoor meets with groups of students to play Frisbee, get ice cream, or even go to a movie. He maintains that this out-of-class contact provides the foundation upon which substantial learning can take place.

Does all of this sound too touchy-feely for you? Would you guess that Blankespoor's classes are most likely soft on learning and big on feeling good? Note that during a typical semester, Blankespoor gives three or four exams followed by a cumulative final. Every exam includes 25–30 percent essay questions which he grades for form as well as content. He requires students to commit large blocks of fundamental material to memory as his course emphasis is on "doing science" rather than simply learning about science. Note, too, that he requires students to learn and perform many techniques associated with the study of the biology of insects. His essay describes a rigorous and vibrant science course where he and the students work very hard together to master the knowledge and skills associated with the discipline.

Blankespoor maintains that, for him, the "cardinal sin of teaching is to have students feel less positive towards me or the subject areas that I teach at the end of the course than they did at the beginning."

Next week, we'll look for some common elements in the instructional practices of the Carnegie Professor of the Year award winners. We've ordered a few copies of *Inspiring Teaching*. If you'd like to borrow one, give the Center for Teaching, Learning, and Faculty Development a call at 487-2046.

CenCITT cosponsors national workshop

MTU's National Center for Clean Industrial and Treatment Technologies (CenCITT) co-sponsored the National Workshop on Process Waste Reduction via Separation Technologies and Separative Reactors with the U.S. Department of Energy, American Institute of Chemical Engineers, Council for Chemical Research, and the American Chemical Society, held in New Orleans on February 4–6.

The workshop brought together representatives from industry, government, trade organizations, and academia to identify opportunities and research needs for pollution prevention in the chemical process industry. The chemical industry will use the conference results to help develop in-process pollution prevention.

MTU participants included Presidential Professor **John Crittenden** (CenCITT, civil and environmental engineering), Research Engineer **John Bulloch** (CenCITT, civil and environmental engineering), Assistant Professor **David Shonnard** (chemical engineering), and **Pete Radecki** (Corporate Relations).

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In print

Professor **Carol Berkenkotter** (humanities) and Instructor **Doris Ravotas** (education) published an article, "Genre as Tool in the Transmission of Practice over Time and Across Professional Boundaries," in the February 1998 issue of *Mind, Culture and Activity*.

Assistant Professor **Kirk Schulz** and PhD candidate **Christopher Wiegenstein** (chemical engineering) coauthored an article, "Deuterium and Deuterium Sulfide Adsorption on MoS₂(0001)," published in *Surface Science*, Vol. 396 (1998). In addition, Schultz, Associate Professor **Anand Kulkarni**, former MS student **T. S. Lim** (electrical engineering), and former MS student **M. A. Khan** (chemical engineering) published a paper, "Electrical, Optical, and Structural Characteristics of Indium-Tin-Oxide Thin Films Deposited on Glass and Polymer Substrates," in *Thin Solid Films*, Vol. 308-309 (1997).

Professor **Martin Jurgensen**, Professor **Dana Richter** (SFWP), Mary Davis, Monica Craft (US Army Engineer Waterways Experiment Station), and Martha McKeelin (USFS) coauthored a paper, "Mychorrhizal Relationships in Bottomland Hardwood Forests of the Southern United States," published in *Wetland Ecology and Management*, Vol. 4 (1997).

Associate Professor **Josiah Heyman** (social sciences) published "Migration to the United States, 1940-1996" in *Encyclopedia of Mexico: History, Society, and Culture*, 1998.

Professor **David Karnosky**, Research Scientist **Mark Coleman**, graduate student **Priit Pechter**, former graduate student **Yingping Sheng** (SFWP), Associate Professor **Gopi Podila**, PhD graduate **Aruna Akkapeddi** (biological sciences), Zofi Gagnon (Marist College), D. E. Riemenschneider, R. E. Dickson, and J. G. Isebrands (USFS) published a paper, "Genetic Control of Responses to Interacting Tropospheric Ozone and CO₂ in *Populus tremuloides*," in *Chemosphere*, Vol. 36 (1998).

MTU notables

The chemical engineering department's Surface Science Laboratory has received a \$150,000 Ford University Research Program Grant to study sulfur poisoning of automotive catalysts.

The three-year grant, awarded by Ford Motor Company, supports PhD candidate **Alan Nelson's** dissertation project, the development of a two-dimensional model of automotive emissions control catalysts. The project is a collaboration among Assistant Professor **Kirk Schulz** (chemical engineering), George Graham, and Bob McCabe, both of the Ford Scientific Research Laboratories in Dearborn. Additional support for this project also comes from the National Science Foundation, which matches industrial support up to \$25,000 per year through Schulz's CAREER Award.

The Seaman Mineral Museum was featured in the first interactive Multimedia Network Design (MIND) project broadcast to twenty-one northern lower Michigan school districts. The districts are linked by the distance-learning network PACE Telecommunications. Museum Director **Stanley Dyl** and Curator **George Robinson** presented "The Significance of Minerals in the Lake Superior Ecosystem," designed to give teachers ideas for classroom lessons and projects.

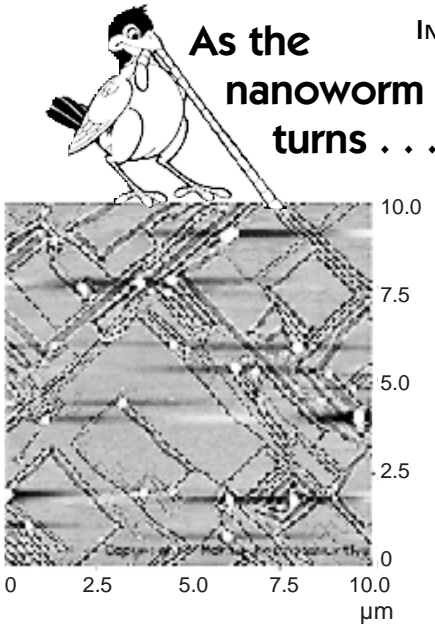
Club Indigo

Naples in Calumet

On Thursday, March 12, Club Indigo presents *The Gold of Naples*, by Italy's most heartwarming director, Vittorio de Sica.

Here is a quartet of delightfully humorous and dramatic stories of life in the most romantic of all Italian cities. A star-studded cast includes Sophia Loren, Sylvana Mangano, and de Sica himself.

The place is the Calumet Theatre, the time is 7:00 p.m., and the cost \$3 or two for \$5. As usual at Club Indigo events, the Keweenaw Co-op presents an appropriate buffet, in this case, an Italian dinner, at 6:00 p.m. for \$6.50.



<http://www.mm.mtu.edu/mbe/index.html>

IN HIGH-END ELECTRONICS, where success hinges on being lighter, faster, and littler, size is the biggest barrier to progress. For when computer circuitry and other tiny devices get to be too small, Newton's comfortable laws yield to the quirky world of quantum physics, where nothing acts like it did before and nobody knows what's going to happen.

So last year, **Mohan Krishnamurthy** and his fellow researchers had no particular expectations as they completed their latest experiment, in which they'd carefully applied a film of a tin-germanium alloy several atomic layers thick to a two-inch disk of germanium (a silicon-like element). Tin and germanium don't get along very well, metallurgically speaking, so the experiment's prospects were unusually cryptic.

"We knew something funny would happen," Krishnamurthy recalls. "But we never expected this."

What they discovered were little tin "worms" digging neat little ditches through the alloy down to the level of the pure germanium. "Like an earthworm, the globs of tin eat up the alloy, spit out the germanium, and keep the tin," he said. And this was no random tangle of trenches. Like soldiers on parade march, the worms had dug out a series of wobbly straight lines and right-angle turns. And, when they finally halted their excavations, they hadn't created the world's smallest circuitboard, exactly; instead, it looked more like an artist's fantasy of how such a circuitboard might look. How small was it? The trenches were 8 nanometers deep, each flanked by tiny mounds of germanium only 4 nanometers high. Plus, they were amazingly long by nano-standards, up to about 10 microns in length.

The researchers' work appeared in *Physical Review Letters* and later in the February 13 edition of *Science*, which published a short article on page 991 under the heading "Quantum Etch-A-Sketch."

Krishnamurthy, an assistant professor in the Department of Metallurgical and Materials Engineering, is a leader in the new field of epitaxial self-assembly, in which a very thin film of one type of substance is applied on top of another. When conditions are right, the top film buckles in a very precise way, forming tiny mountains, islands, or other nanostructures on top of the substrate. The goal is to develop a pattern of these nanostructures that have applications in microelectronics, similar to the way wires conduct electricity in a circuit.

Since he coauthored a groundbreaking paper on the subject in 1993, Krishnamurthy has concentrated his efforts on films and substrates made of silicon, the element of choice for the electronics industry. However, he notes, at the nano-level—anything smaller than 100 nanometers, or one-tenth of a micron—quantum physics kicks in, which opens up all kinds of new possibilities. For instance, the properties of those quantum germanium mounds dug up by the tin earthworms could be far different from ridges of regular-sized germanium. As an example, nano-germanium might turn out to be a good light-absorber, and thus have potential as a laser.

"All kinds of new properties could come out of this," Krishnamurthy said, adding, "There's a lot of work that needs to be done."

Krishnamurthy credits Professor **Stephen Hackney** (MME), an expert in the phase transformation of metals, for helping determine the underlying rationale for the tin worms' excavating behavior. PhD students **Xurui "Sherry" Deng** and **Becky Yang** (MME) also contributed to the research project.

Talk March 5

C&H uranium mining in N. Mexico

The role of Calumet and Hecla Consolidated Copper Company in Cold-War-era uranium mining is the topic of the next Archival Speakers Series presentation, set for Thursday, March 5, at 4:00 p.m. in the Archives Reading Room. The series is sponsored by the MTU Archives and Copper Country Historical Collections.

David Salmanson, a doctoral student in history at the University of Michigan, will discuss his research into the rise and fall of uranium mining in western New Mexico. Calumet and Hecla's Uranium Division operated a successful uranium operation at the Marquez Mine near Grants, New Mexico, from 1953 to 1964. The mine was one of many C&H initiatives undertaken in search of alternatives to declining Keweenaw copper reserves.

Salmanson has studied a variety of companies, mines, and townsites in western New Mexico, and his research examines how Anglos, Mormons, Hispanos, and Navajos were affected by the availability of wage work and the influx of new groups of people. From the making of a male miner culture in Grants to the kidnapping of the mayor of Gallup, his study explores the impact the Cold War wrought on the people of western New Mexico from 1950 to 1981. Salmanson uses oral histories, government reports, census data, and newspapers to assess the relationship between uranium mining and economic development in the barren and arid southwestern region. Salmanson's interest in the role played by C&H in this larger story was supported by a research travel award given by the Friends of the Van Pelt Library. With the research award, Salmanson was able to travel to Houghton to study C&H records at the MTU Archives.

The presentation is free and open to the public. Refreshments will be provided by the Friends of the Van Pelt Library. For more information, contact the MTU Archives at 487-2505 or at copper@mtu.edu



On the road

Professor **Anant Godbole** (mathematical sciences) gave two talks, "Real and Complex Analysis: An Amalgam for Undergraduates" and "Incorporating Undergraduate Research into Upper Level Mathematics Classes," at the Annual American Mathematical Society Meeting, held January 7-10 in Baltimore.

Professor **Gopal Jayaraman** (ME-EM) presented a poster, "Efficacy of Chest Pads Against Baseball Impacts on the Chest of Children in Little League," coauthored by Associate Professor **Thomas Grimm** and Research Engineer/Scientist **Robert Whipple** (ME-EM) at the American Sports Medicine Institute Conference on Baseball Injuries held January 21-25 in Birmingham, Alabama.

Several members of the MTU community attended the Sixteenth International Modal Analysis Conference, held January 31-February 5 in Santa Barbara, California. At the conference, Associate Professor **Charles Van Karsen** (ME-EM) chaired a session entitled "Basics of Modal Analysis for the

New Engineer" and attended the *Journal of Mechanical Systems and Signal Processing* Editor's Meeting. Former graduate student **Jason Blough** (University of Cincinnati) presented a paper, "Independent Operating Shape Determination on Rotating Machinery Based on Order Track Measurements," coauthored by Van Karsen and David Brown (University of Cincinnati). Also attending the conference were Professor **William Shapton** (ME-EM), Director **Jay Meldrum** (KRC), Senior Research Engineer/Scientist **Scott Gruenberg** (KRC), and ME-EM graduate students **Miles Dexter**, **Christopher Green**, **Geoffrey Gwaltney**, **Christopher Kurmaniak**, and **Neal Stangis**.

Presidential Professor **John Johnson** (ME-EM) gave a presentation on the collaborative undergraduate engineering program between MTU and General Motors Corporation at the American Society for Engineering Education Conference for Industry and Education Collaboration held February 2-6 in Savannah, Georgia.

POSITIONS AVAILABLE AT MTU

Job descriptions are available from Human Resources starting at 1:00 p.m. on Friday. You can e-mail us at JOBS@MTU.EDU and we will e-mail you the job description you request.

The following position will be posted Friday, February 27, 1998, at 1:00 p.m. through noon, Friday, March 6, 1998, in the Human Resources Office.

Secretary II—Publications/Photo Services (Regular, full-time, UAW internal and external posting)

University employees are reminded to apply in writing prior to noon, Friday, March 6, 1998, to be considered as internal candidates for bargaining unit positions only. Applicants from the recall pool will be given first consideration for non-bargaining-unit positions only. Vacancy announcements are normally posted every Friday at 1:00 p.m. in the Human Resources Office. Complete job descriptions are available in the Human Resources Office or by calling 487-2280. More information regarding employment opportunities is available by calling the Job Line at 487-2895. Michigan Technological University is an equal opportunity educational institution/equal opportunity employer.

February

BLACK HISTORY MONTH

- 26 **Thursday**
1:00 p.m.—Men's basketball, GLIAC quarterfinals, NMU v. Saginaw Valley State—SDC
3:00 p.m.—Men's basketball, GLIAC quarterfinals, Northwood v. Ferris State—SDC
6:00 p.m.—Men's basketball, GLIAC quarterfinals, Ashland v. Gannon—SDC
6:00 p.m.—Women's basketball, GLIAC quarterfinals, MTU v. SVSU—Northern Michigan University
8:00 p.m.—Men's basketball, GLIAC quarterfinals, MTU v. Mercyhurst—SDC
- 27 **Friday**
noon—Coaches Corner/BlueLine Club luncheon—Franklin Square
6:00 p.m.—Men's basketball, GLIAC semifinals, NMU-SVSU winner v. MTU-MC winner—SDC
8:00 p.m.—Men's basketball, GLIAC semifinals, NU-FSU winner v. AU-GU winner—SDC
8:05 p.m.—Hockey, Mankato State at MTU—MacInnes Student Ice Arena
- 28 **Saturday**
5:05 p.m.—Hockey, Mankato State at MTU—MacInnes Student Ice Arena
8:00 p.m.—Men's basketball, GLIAC Championship—SDC

March

NATIONAL WOMEN'S MONTH

- 3 **Tuesday**
4:00 p.m.—David Salmanson on C&H uranium mining in New Mexico—Archives Reading Room
- 5 **Thursday**
noon—Basketball luncheon—Memorial Union 105
- 7 **Friday**
10:00 a.m.–5:00 p.m.—Family Fun Day—SDC, Memorial Union
- 10 **Tuesday**
noon—Basketball luncheon—Memorial Union 105
- 12 **Thursday**
4:00 p.m.—Britt-Louise Gunnarsson, "Images and Image Work: The Discursive Construction of the Bank"—Walker Theatre
6:00/7:00 p.m.—Club Indigo: Italian buffet and *The Gold of Naples*—Calumet Theatre
- 13 **Friday**
8:00 p.m.—Hypnotist Fred Winters—Fisher 135
- 14 **Saturday**
8:00 p.m.—Hypnotist Fred Winters—Fisher 135