

September 2007						
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# INSIDE VT WOOD

## Reminder...

Remember to submit department news items by Friday 3 p.m. of each week to Will Pfeil at [wpfeil@vt.edu](mailto:wpfeil@vt.edu) for inclusion in Inside VT WOOD each Monday morning. All past issues of Inside VT Wood reside on our department website under the publications link.

## News From Paul Winistorfer

- Note the date: Tuesday September 25 the Farm Bureau Board of Directors will be on campus and will be visiting the Brooks Center from 10:00 am – 4:30 pm pm, where the bioprocessing/biomaterials research group will hold a poster forum. Faculty from Biological Systems Engineering will participate in the event. Attention to housekeeping is appreciated.
- Friday I will be meeting with a group of interested departments about the concept of a ‘wood design’ focus or initiative on the Virginia Tech campus. Participants include the departments of architecture, interior design, building construction, and art, and wood science.
- November 29th the department faculty are invited to participate in a regional discussion and planning conference in Southside. This event is being planned by the regional partnership to bring WoodLINKS USA and educational programming to the high schools, community colleges, Higher Education Center, and Virginia Tech. Mark your calendar now and watch for further details.

## WBC Hosts Wood Adhesion Short Course

On September 12 and 13, the Wood-Based Composites Center hosted it's Eight Wood Adhesion Short Course. Twenty-nine participants spent two days learning about adhesion and adhesives used in the wood composites industry. The short course was held at the Skelton Conference Center and included laboratory exercises and demonstrations at the Brooks Forest Products Center. The



course instructors included Chip Frazier, Joe Loferski and Dan Hindman from Virginia Tech, and Fred Kamke, from Oregon State University. A fun learning experience was had by all! Visit the website of the WBC Center for more short course opportunities at <http://www.wb.c.vt.edu>.

## Study Abroad is for Everyone!

The University is holding its annual campus-wide Study Abroad Fair from 10 AM – 4 PM on the Drill Field on Wednesday, September 26, 2007. All students and faculty are encouraged to attend. The Department is organizing courses during 2008 in Switzerland, New Zealand, Fiji and Australia. We also need faculty to help lead these courses.

Just drop in at the big tent to see how you can be more involved in international programs. There are countries and programs for all majors. Come join us on the Drill Field. Contact Tom Hammett for more details. By phone at 231-2716 or email at [himal@vt.edu](mailto:himal@vt.edu)

## Study Abroad in the South Pacific!

Information Session: **September 26, 7pm – 9pm, McBryde 129**

*“Sustaining Human Societies and Their Natural Environments”*



**VT Faculty-Led  
Summer Study  
Abroad Programs  
in:**



## Australia, Fiji, & New Zealand

**NR 3954/5954, 3 – 9 credits (open to all majors)**

**Come to an information session to find out how to take classes while traveling and experiencing the nature and culture of the South Pacific !!!**

**Come on WED Sept 26, 7pm – 9pm, McBRYDE Room 129**

**Or contact: Tom Hammett, College of Natural Resources - 231-2716 or [himal@vt.edu](mailto:himal@vt.edu)**



WWW.NAHB.ORG

NATIONAL ASSOCIATION OF HOME BUILDERS

## HOUSING STARTS FALL 2.6 PERCENT IN AUGUST

[Normal View](#)

**September 19, 2007** - Housing starts fell 2.6 percent in August to a seasonally adjusted annual rate of 1.331 million units as the downswing in the housing market continued, according to figures released by the Commerce Department today. Starts were down 19.1 percent from a year earlier, falling to the lowest level in 12 years.

Starts of new single-family homes were down 7.1 percent for the month to a seasonally adjusted annual rate of 988,000 units. The August pace for single-family construction was 27.1 percent below a year earlier.

"Today's report is very much in line with what builders are reporting in our own surveys — that they are cutting back on new production and focusing on reducing their inventories by offering a variety of incentives to boost sales and limit cancellations," said Brian Catalde, president of the National Association of Home Builders (NAHB) and a home builder from El Segundo, Calif.

"The housing market is still contracting, but yesterday's action by the Federal Reserve to cut the federal funds and discount rate calmed the financial markets and sent a message to American consumers that our central bank intends to ensure that the economy continues to move ahead," said NAHB Chief Economist David Seiders. "This will help to support housing, especially if the Fed takes further action in the months ahead. We expect starts and permits to bottom out by mid-2008 before a systematic recovery process gets underway."

Multifamily housing starts increased 12.8 percent to a seasonally adjusted annual rate of 343,000 units for the month. The pace of multifamily construction was 17.9 percent above August 2006.

Total building permits fell 5.9 percent in August to a seasonally adjusted annual pace of 1.307 million units. Total permits were down 24.5 percent from a year earlier.

Single-family permit issuance was down 8.1 percent to a pace of 926,000 units for the month. This was 27.9 percent below a year earlier. The rate of multifamily permit issuance, 381,000 units for the month, equaled the July pace but was 14.6 percent below the August 2006 pace.

Regionally, starts of new homes and apartments were up in the Midwest and South in August by 4.2 percent and 11.4 percent, respectively, because of an increase in multifamily construction. Housing starts were down in the Northeast by 37.7 percent and in the West by 18.4 percent. All four regions reported a pace of construction well below a year earlier.

For more details, in-depth market analysis, forecasts, and housing statistics visit [www.housingeconomics.com](http://www.housingeconomics.com), the online publication from NAHB Economics Group.

## General Announcements

### B.C. Beetle Kill

Source: Market Barometer, September 5, 2007

In B.C., the mountain pine beetle now occupies an area 1,200 km long and 575 km wide. According to industry estimates, some \$43-billion worth of lumber products is now at risk, six times the value of last year's softwood lumber exports to the U.S., and \$10.2-billion worth of stumpage fees. Scott Nelson, mayor of Williams Lake, says Alberta is now also being seriously affected, asserting that in 2005 there were an estimated 15,000 infested trees, a number that has now climbed to over five million. The mountain pine beetle, while living for thousands of years in B.C. forests, has never in recorded history struck so voraciously. Contributing factors include warmer

winters, recent droughts, decades of successful firefighting, and an ability to now inhabit young (25-year-old) pine stands and those up to 1,600 metres above sea level. In perspective, during an aerial survey this July, provincial bark beetle co-ordinator Rod DeBoice's helicopter was forced to land due to the canopy of beetles occupying the windshield. As part of the reduction strategy, B.C.'s Chief Forester has announced hefty increases to annual allowable cuts. Federal and provincial governments have promised millions for pine-beetle-related programs. Ottawa has agreed to provide \$1 billion over ten years.

### Georgia Tech's Strategic Energy Institute focuses on biofuels and biomaterials from forest products

Fuel prices are at record highs, a situation with disastrous consequences for poor countries. Biofuels are seen as a way to counter this trend, but only a handful of countries currently succeeds in making fuels that are competitive with oil products. However, scientists across the world are focusing on developing technologies and processes that should make it possible to tap abundant sources of biomass and bring down production costs. Efficient bioconversion techniques can be shared with the South, so that it can overcome the catastrophic social and economic effects of high oil prices.

Researchers at Georgia Tech are very active in the sector and are focusing on converting cellulose-rich forest products into biofuels, in an integrated biorefinery that yields high value bio-based materials besides fuels. They understand that many energy issues require a multi-disciplinary approach, which is why this university launched the Strategic Energy Institute (SEI), created to enable, facilitate and coordinate programs related to energy research and education. Their research efforts are interdisciplinary and take an integrated systems approach.

The Strategic Energy Institute has been broadly engaging companies to define projects that many faculty members at Georgia Tech can pursue in a collaborative effort. One of the main projects aimed at advanced technologies to make transportation fuels from forest-based biomass is made possible with funding from Chevron, Atlanta startup C2 Biofuels, the Georgia Research Alliance and one of the U.S. Department of Energy's new BioEnergy Science Centers.

The Georgia Tech researchers are examining and optimizing the five major steps required to produce bioethanol from woody biomass. These steps include (1) selecting the best plant material, (2) preparing the plants for conversion, (3) breaking down the carbohydrates into simple sugars, (4) fermenting the sugars into alcohol and (5) separating the ethanol from water. Let's have a quick look at their advancements.

#### 1. Selecting a biomass source

Bioethanol produced from corn is being manufactured at a rate of more than 5 billion gallons per year in the United States, but concerns exist about the future price and availability of corn as a food crop if its being used to help meet energy needs.

Because forest products are a more efficient source of ethanol and more than 5 million tons of trees are available for harvest each year in Georgia beyond what is needed for pulp mill and sawmill production, Georgia Tech researchers are turning to Southern pine trees. Switchgrass, a fast-growing tallgrass, is another attractive source of

plant material because of its ability to grow in poor soil and adverse climate conditions, its rapid growth and its low fertilization and herbicide requirements:

energy :: sustainability :: biomass :: bioenergy :: biofuels :: wood :: lignocellulose :: ethanol :: bioconversion :: biorefinery ::

Art Ragauskas, a professor in the School of Chemistry and Biochemistry, studies the chemistry and structure of the starting plant material to determine which varieties and characteristics of switchgrass and pine trees improve conversion to ethanol:

## **2. Pre-treatment**

Ragauskas also examines how different acids react with the wood chips to make accessible the complex interior mixture of carbohydrate polymers, including cellulose, hemicellulose and lignin.

Pre-treatment is performed under severe chemical conditions and very high temperatures. Understanding the chemistry should allow the researchers to make pre-treatments more efficient, less costly and more effective, says Ragauskas.

After the acid pre-treatment, the wood is placed in a reactor and exposed to high-pressure steam.

John Muzzy, a professor in the School of Chemical and Biomolecular Engineering, and Kristina Knutson, a postdoctoral fellow in the School of Chemistry and Biochemistry, are working with Ragauskas to develop a continuous reactor that will employ mechanical energy and/or boiling water instead of acid and high temperatures to break up the wood. That would greatly reduce processing and chemical costs while increasing the life expectancy of the reactors, Ragauskas notes.

## **3. Breaking down the sugars**

After the pre-treatment, the cellulose and hemicellulose are further broken down to free the sugar for fermentation to alcohol. Commercially available enzymes can do this, but they are too expensive to use in biofuel production, according to Andreas Bommarius, a professor in the School of Chemical and Biomolecular Engineering and the School of Chemistry and Biochemistry. As an alternative, he is identifying novel enzymes and engineering them to be longer-lasting and more effective at breaking down cellulose polymers to sugars than those commercially available.

Bommarius and his team wants to produce enzymes more efficiently and make them more active and stable, at the same time improving bioethanol production at a lower cost.

## **4. Fermentation**

In conventional ethanol production, the sugars obtained are then fermented with yeast to produce alcohol. Rachel Ruizhen Chen, an associate professor in the School of Chemical and Biomolecular Engineering, is working to increase the ethanol production rate by using the bacteria *Zymomonas mobilis* instead of yeast in the fermentation process because it has a three- to five-fold higher productivity than yeast when making bioethanol. Chen plans to manipulate the enzymatic, transport and regulatory functions of the bacterial cell to improve the bioethanol fermentation process.

The lignin portion of the biomass must be extracted from the mixture prior to fermentation. Unfortunately, current pre-treatments break down some of the lignin, which enables it to be carried over to the fermentation process where it acts as a fermentation inhibitor.

William Koros, the Roberto C. Goizueta Chair in the School of Chemical and Biomolecular Engineering, is investigating efficient ways to separate the lignin from the cellulose and hemicellulose portions of the biomass. Koros, a Georgia Research Alliance (GRA) eminent scholar in membranes, plans to extract the lignin byproducts by pulling the hydrolyzed biomass mixture through a selective membrane with a vacuum using a process called pervaporation.

Lignin is an important by-product of the enzymatic process and has many potential uses. Ragauskas is examining the possibility of converting lignin to a biofuel precursor or using lignin as a building block chemical to make new polymers or chemicals. Professors Christopher Jones and Pradeep Agrawal, both of the School of Chemical and Biomolecular Engineering, are exploring ways to chemically fractionate pine and convert suitable portions to true gasoline fuels.

To produce a biofuel with a similar energy density to gasoline from renewable feedstocks, they plan to convert pre-treated pine to fuel using chemical catalysts traditionally used by the petroleum industry, rather than enzymes. These biofuels could yield higher miles-per-gallon than traditional ethanol-rich fuels such as E-85, according to Jones.

### **5. Separating ethanol from water**

For bioethanol, once the sugars are fermented into alcohol, a significant amount of water must be separated out. This separation primarily occurs in a distillation column, which involves heating the mixture and separating the components by the differences in their boiling points.

Distillation is very energy intensive and expensive, and it might defeat the purpose when you're trying to produce biofuel economically, says Sankar Nair, an assistant professor in the School of Chemical and Biomolecular Engineering, who is collaborating with Koros on two separation projects aimed at improving the energy efficiency of the biofuel process.

A membrane-based approach would avoid the need to supply heat energy, and instead rely on differences in the transport rates of the components through a membrane to achieve separation. The challenge is in producing selective membrane systems that can produce pure ethanol. Polymer materials have been widely investigated and have the advantage of high throughput, but such membranes can't yet produce pure ethanol from a dilute ethanol-water mixture, notes Nair.

Instead, Koros and Nair are exploring membranes that contain nanoparticles of porous inorganic materials called zeolites that are so small they can be dispersed efficiently into a polymer matrix. The very specific porosity of the zeolite should allow separation of ethanol from water. By using two membranes in series the first hydrophobic to remove ethanol from a large mass of water and the second hydrophilic to remove any trace water in the ethanol product from the first membrane it may be possible to design an economical membrane process for biofuel separation from water.

Taking a systems approach: the biorefinery

Producing ethanol from biomass involves more than these process steps. Researchers must also decide how to ship the biomass to the processing plant, how large the processing plant should be, where it should be located, and how to ship the ethanol to fueling stations.

References:

Georgia Tech: Georgia Tech Takes Comprehensive Biofuels Approach - September 16, 2007.

Strategic Energy Institute: Georgia Tech Part of New Biofuel Research Center - June 29, 2007.

<http://timberbuysell.com/Community/DisplayNews.asp?id=1473>

### **New Report Details Potential Devastation of Sea Level Rise**

A coastal impact study Nation Under Siege issued today by Architecture 2030 makes clear that without a moratorium on coal, the United States will be unable to avert the dangerous impacts of climate change. Ed Mazria, founder of Architecture 2030, released the report at the Sundance Summit in Utah, a gathering of more than 40 mayors from across the country who are gathered to discuss the science behind and the local solutions to global warming. The study includes new visual imaging and reveals that, beginning with just one meter of sea level rise, many areas of the US will experience devastating consequences.

You can find the report at: [http://www.architecture2030.org/current\\_situation/coastal\\_impact.html](http://www.architecture2030.org/current_situation/coastal_impact.html)

### **Fall Conversations With Faculty**

By Nancy Polk (npolk@vt.edu), CEUT

CEUT's Conversations With Faculty Series offers critiques by faculty of their teaching experiences. This fall's line up highlights three curricular designs that have great potential for engaging students in their learning. (Register at: <http://128.173.76.112:591/ceut/text/events/register.html>)

### **Learning Communities (Thursday, September 27, 3:00-5:00, III Hillcrest Dining Room)**

Jack Dudley, University Honors Program  
Jamie Penven, Residence Life  
Ed Spencer, Student Affairs

Def.: learning communities—curricular and non-curricular structures that link together classroom and non-classroom work so that students have opportunities for deeper understanding and integration of the material they are learning and more interaction with one another and their teachers as fellow participants in the learning enterprise. Sounds ideal! But, what should we know in order to realize the enormous potential of these programs? Join Jack, Jamie, and Ed as they consider their years of experience building, maintaining, and studying these communities and help shed light on some of the essential components for success.

### **Study Abroad (Friday, October 12, 2:00-4:00, 1810 Litton Reaves)**

Rick Fell, Entomology  
Tom Hammett, Wood Science & Forest Products  
Jim Littlefield, Marketing

To succeed and prosper in a global economy and interconnected world, U.S. students need international knowledge, intercultural communication skills, and global perspectives. Recognizing international study as an essential part of preparing for a successful career in a globally interdependent world, American students are studying abroad in record numbers. While this growth in U.S. international education is encouraging, how effective are these programs in achieving their aims and how might we maximize the experience for our students? Please join this group of faculty as they consider program designs and conditions that seem to produce successful learning in students who go abroad.

### **Global Classrooms – Transcending National Boundaries, Cultures, and Backgrounds (Wednesday, November 14, 2:30-4:30, Hillcrest Dining Room)**

Sharon Johnson, Foreign Languages  
James McKenna, Crop & Soil Environmental Science  
Brian Murphy, Fisheries & Wildlife Science

Jim and Brian and their partners from institutions around the world are engaging students in issues that are all the more complex when viewed through multiple lenses. Case studies about the environment, natural resource management, and food production systems provide context, and international video conferencing, discussion boards, and online chats provide venues, for multi-national student discussions about important issues. Sharon is using the cross-cultural projects she has co-created, as well as asynchronous chats and video-conferencing to engage students at Virginia Tech, the Sorbonne, and the Institut National des Télécommunications in an exchange of ideas on a selection of themes and contemporary issues. These students analyze images pertaining to France and the United States that challenge both students and professors to interrogate their own cultural perspectives as they strive to understand disparate points of view. These are but a few examples of global classrooms that let students experience a truly international perspective. What challenges do we face in creating such experiences? Come join this conversation and explore what's possible, even with limited resources, when we reach beyond our borders.

### **Teaching Workshops Offered by CEUT OCT 3-4**

By Terry Wildman (wiley@vt.edu), CEUT

CEUT is pleased to offer two workshops in early October that focus on what we would characterize as fundamentals of teaching. These two workshops are delivered by Margaret Hable, a long-time consultant with CEUT and excellent presenter. The trademarks of her work with faculty are relevance, practicality, and active engagement. Please consider joining us for either or both of these events. Please register at [www.ceut.vt.edu](http://www.ceut.vt.edu).

### **Building Classroom Environments for Learning and Engagement**

Margaret Hable, CEUT Consultant  
Wednesday, October 3, 2:30-5:00pm, 1810 Litton Reaves

This workshop deals with the art of establishing a course/classroom environment that supports learning and engagement. Participants will explore a range of specific procedures, rituals, expectations, and instructional strategies that combine to build a positive learning environment. The outcomes we are looking for include deep engagement by students in instructional activities, enhanced motivation, and the experience of becoming part of a community of learners.

### **In-Class, Informal Assessments of Learning: Finding out if they're "with" you!**

Margaret Hable, CEUT Consultant  
Thursday, October 4, 2:30-5:00pm, 1810 Litton Reaves

Do you ever wonder at the close of a class session, "Are they really learning the material I am teaching? Are they with me?" This workshop offers strategies you can use to find out! Participants will leave with a variety of practical classroom assessment techniques (CATs) that enable college teachers to gain informal feedback about students' learning and levels of understanding. CATs are quick and easy; they can be used at the beginning, middle or end of class. Sample strategies that will be discussed and illustrated include Exit Slips, Entry Slips, Minute Papers, Muddiest Point, Focused Listing, Background Knowledge Probes, and more.

## **2007-08 Graduate Policies and Procedures**

By Anne McNabb

The 2007-08 Graduate Policies and Procedures have been posted on the Graduate School website, <http://www.grads.vt.edu/>, in the section under Academics. New policies, passed by the Commission on Graduate Policies and Procedures and described in Dean's Monthly Memos during last academic year, have been added to the document. We have added some descriptive detail and tried to clarify wording in cases where some of you have pointed out problems or where we've noted policy misunderstandings by graduate students. The document now includes a Table of Contents and you can highlight and copy from sections of the PDF. This feature was requested by the Graduate Coordinators. If you have questions or find potential errors, please let me know.

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## **The Inn at Virginia Tech and Skelton Conference Center**

Economic development is important to the state of Virginia and its citizenry. The focus of Outreach NOW 2007 is on how you, as a Virginia Tech faculty or staff member, play a pivotal role in improving the economic and civic vitality of the Commonwealth of Virginia.

The afternoon conference begins at 1:00 p.m. and provides an opportunity to continue the dialogue on best practices in outreach and engagement and features a keynote address by Mark Warner, former governor of Virginia (invited), faculty presentations, exhibits, a poster session highlighting the work of faculty, students, and staff, and an awards ceremony acknowledging outreach scholars. A reception follows the program at 5:00 p.m.

Please mark your calendar to attend this exciting forum. More information will follow about how to register, present a paper or a poster, or exhibit at this event.

For more information, visit and bookmark <http://www.opd.vt.edu/outreachnow/>.