



GKN Aerospace tops list of PFE employers

For the past two years, the company hiring the greatest number of our graduates has been GKN Aerospace, a global first tier supplier of structures, components, assemblies and engineering services to aircraft and aero engine manufacturers. GKN came to Tallassee, Ala., in 1998 by acquiring a former Dow UT site. As GKN grows and adds new projects to the RTM and airframe components facility, they call on Auburn University and particularly the Department of Polymer and Fiber Engineering for composite engineers. Nine alumni from our department have been hired by GKN in several project areas, including Sikorsky, GE Aerospace, Airbus and HondaJet Composite Fuselage.

John Kochel, program manager of HondaJet Composite Fuselage, is interested in supporting educational backgrounds appropriate to the needs of the 21st century aerospace industry in Alabama. Because of GKN's recruitment of our engineers and their interest in the polymer and fiber program at AU, Kochel has been elected to the board of the Alabama Textile Education Foundation. ATEF serves as the industry advisory board for the Department of Polymer and Fiber Engineering. Trustees have the opportunity to influence the direction of the department, including curriculum changes, areas of future research, development of new laboratory facilities and scholarship funding.

"GKN has worked hard to build a close relationship with Auburn University benefiting the students, the community, the company and the university. This program has been such a success that it is being extended further," states James Stewart, operations manager. As part of that effort, GKN has expanded its co-op and summer intern programs this year. One of their co-op students is a junior polymer and fiber engineer from Tallassee, Ala.

In the future, the department looks forward to joint student projects with GKN. Our students will gain relevant aerospace and composite engineering experience. GKN will gain further access to project engineering resources as well as the opportunity to recruit candidates with high potential for future employment.



Katy Hudson (FBEN '06), left, Clint Tranum (FBEN '06), Kevin Hughes (TXEN '01, M.S. '05), and Toccara Hunter (FBEN '05) are four of our alumni working in Tallassee with GKN Aerospace.



Congress funds novel polymeric material and structures research

In 2006, the Department of Commerce funded the Program for Advanced Research and Development of Novel Polymeric Materials and Structures at Auburn University. New polymer labs will provide possibilities for joint research in polymers and reinforced materials with industry as well as the Auburn University Peaks of Excellence programs in Detection and Food Safety and Transportation, the Pulp and Paper Research and Education Center, and the Center for Microfibrous Materials Manufacturing.

New polymeric materials will enhance existing products and lead to the development of new products. An example of the latter is a satellite that, in order to complete its intended functions, must maintain its exact dimensions as it passes through day and night in the course of its orbit. Polymers used in both the fibers and encapsulation (matrix) in composites for satellites can be manufactured to have high-dimensional stability over a broad range of temperatures. Without composites, much of the satellite technology would be impossible to achieve.

Novel polymeric materials will serve useful purposes in sectors including aerospace, automotive, marine, military, transportation, infrastructure, construction and biomedical. Because advanced polymers can be engineered to have properties quite different than conventional materials, new vistas are open to designers whose ideas were limited by the low strength-to-weight ratios or thermal expansion/contraction properties.

This project builds upon previous research and development of polymeric materials, equipment and measurement techniques. The research will continue improvements in existing polymeric materials and the development of novel polymers. Results will provide more accurate data for formulating optimal processing parameters to enhance mechanical properties and reduce processing time. The project will also develop architecture for facilitating the use of the generated data by manufacturers of polymeric materials and other industrial customers.

Lead contact: Peter Schwartz, 334.844.5452, schwartz@auburn.edu

Enrollment growing with polymer and fiber engineering major

After years of decreasing enrollment, the department is enjoying new growth with the conversion to polymer and fiber engineering in fall 2006. Official enrollment for fall 2007 is 50, up from 35 in fall 2006, the first semester of polymer and fiber engineering.

The first graduates in polymer and fiber engineering/polymer option are expected in 2009. Until then, students in fiber engineering are able to satisfy the requirements for graduation in both fiber engineering and the fiber option of polymer and fiber engineering. Fiber engineering is accredited by ABET, while both options of polymer and fiber engineering will be evaluated in 2010.

AU approves master's degree in PFE

The master of science in polymer and fiber engineering was approved by Auburn University in fall 2006 and submitted to the Alabama Commission on Higher Education (ACHE) in December 2006. The first master's degree in polymer and fiber engineering was awarded in May 2007.

The faculty has begun the longer process of establishing a doctorate in polymer and fiber engineering. Current doctoral students are in the Integrated Textile and Apparel Science (ITAS) program, administered jointly with the Department of Consumer Affairs.

Gisela Buschle-Diller is the polymer and fiber engineering graduate program officer. For information on our graduate programs, please visit www.auburn.edu/pfe or contact her at buschgi@auburn.edu.

Department broadens K-12 outreach activities

Long a popular field trip destination for area schools, the Department of Polymer and Fiber Engineering is now a science and engineering activity center for groups of all ages. Activities during the past year include the Composite Merit Badge activity for Boy Scout Merit Badge College at AU, the Alabama Science Olympiad polymer competition, continuing education activities for K-12 teachers, College of Engineering TIGERs camp for junior high and high school students, and the annual Civil Air Patrol E-Tech camp. Faculty and staff are now working with AU's outreach program to plan community courses and activities for Elderhostel.

One chemistry lab activity is a forensics game, originally developed by students. To solve a crime, teams test fibers and polymers with microscopic examination, ID stain, burn tests, density tests and chromatography of ink. The difficulty level is adjusted according to the age of the participants. Other chemistry lab activities involve polymer recycling and super-absorbent polymers.

In the composites lab, depending on the age of the participants and time constraints, students make skateboard decks, composite air foils and reinforced polymer paperweights. Another game developed by our students for K-12 visitors is Science Wheel of Fortune, with questions for elementary school and high school participants.



Students learn about the department during TIGERs camp.

Auad joins polymer and fiber engineering faculty

Maria Lujan Auad joined the Department of Polymer and Fiber Engineering in fall 2006 as an assistant professor and has redirected the future of polymer research in the Samuel Ginn College of Engineering. After earning her bachelor's degree in chemical engineering and doctorate in materials science from the University of Mar del



Auad

Plata in Argentina, Auad served two years as a post-doctoral researcher with the Department of Chemical Engineering at the California Institute of Technology. Her research at Cal Tech focused on the properties of liquid crystal polymers. Prior to joining our faculty, she also spent four years conducting post-doctoral research in nanocomposites with the Department of Materials Science at the University of Southern California.

Auad's current research involves the development of shape memory polymers and nanofillers, such as non-cellulose crystal, carbon nanotubes, carbon nanofibers and ferro-magnetic particles. Her team is improving the performance of shape memory polyurethanes by reinforcing them with nano-cellulose crystals. These

materials have enabled the creation of novel medical devices such as "smart sutures" and biological microelectromechanical systems and have potential applications for obtaining objects that must be manipulated in inaccessible locations, such as complex machinery and microsystem assemblies.

Auad's teaching areas include polymer nanocomposites, polymers for structural and biomedical applications, flow behavior of polymers, rheology, and control of microstructure and nanostructure in materials.

Auad is a member of the American Chemical Society, Materials Research Society, and Society of Rheology. She has received numerous fellowships as well as being honored by the Women in Science and Engineering Program at USC.

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Davis named new assistant research professor

Edward W. Davis joined the Department of Polymer and Fiber Engineering in fall 2007 as an assistant research professor. He is conducting research in the areas of polymer nanocomposite production and processing, packaging materials development and improved coating systems. Davis is working closely with area businesses to develop research that will benefit local industries.

After earning degrees in biomedical engineering and chemical engineering at Tulane University in New Orleans, Davis earned his doctorate in chemical engineering at the University of Akron in Akron, Ohio. In his dissertation he explored the relationship between composition of precursor systems, final morphology of reacted systems and ultimate use of polymerized bi-continuous microemulsions as a controlled release material.

Davis served as a researcher in the Exploratory Research Group with the Shell Research and Technical Center in Louvain-la-Nueve, Belgium, conducting research in the areas of nanocomposite systems for coatings and mechano-chemistry for plastics recycling. He then served in technical support for Shell Polyester Technical Center. As a senior principal research engineer with EVAL Company of America in Pasadena, Texas, Davis worked on the development of new EVOH based polymers for packaging and the development of co-injection processing techniques to successfully produce multilayer containers for the food and beverage industry. More recently he has worked with CSP Technologies in Auburn, on the improvement of polymer compounding and injection molding technologies before joining the department.



Davis

Davis' areas of research include polymer processing, polymer nanocomposites for improved material properties and nanostructure property relationships.

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RESEARCH

Natural hydrogel research

USDA Forest Service Wood Education and Resource Center (WERC) awarded research funding to investigate natural hydrogels from low-value forest products. Together with the USDA Forest Products Laboratory in Madison, Wisc., faculty members Gisela Buschle-Diller and Yasser Gowayed are developing superabsorbent hydrogel materials based on low value woody biomass and chitosan, a waste product of the shellfish industry. The goal for these "green" hydrogels is to pick up and release liquids 500-1,000 times their dry weight without disintegration. They could find applications in the cosmetic, food or medical industries for delivery of active compounds. The hydrogels will be produced in the form of thin films, coatings, beads and fibers. A workshop will be offered for the interested forest products industry upon finalization of the project.

PFE faculty hosts seminars

The Department of Polymer and Fiber Engineering hosted several seminars in 2007. The Theory and Application of Thermal Analysis and Rheology seminar was an overview of the science and application of Thermal Analysis and Rheology. Thermal Analysis is a series of techniques that measure material properties as a function of temperature, time and atmosphere, including, Differential Scanning Calorimetry (DSC), ThermoGravimetric Analysis (TGA), and ThermoMechanical Analysis (TMA). Rheology is the science that measures the deformation and flow of materials, including, Dynamic Mechanical Analysis (DMA) and Rotational Rheology. Maria Auaud co-hosted with TA Instruments. Research scientists, technical experts, engineers, system users and safety managers from the southeast attended the one-day event.

AU alumnus Warren O. Haggard, professor and Herff Chair of Excellence in the Biomedical Engineering Department at the University of Memphis, presented a seminar to PFE students, faculty and the AU community titled, "Regenerative Medicine: A Few Simple Polymeric Approaches." Regenerative medicine and tissue engineering research have great promise for solving many ongoing clinical problems and issues. The tissue engineered bladder and fibrous cartilage ear are two examples. Many complex and difficult research and development opportunities remain to be pursued for full development and implementation of these unique and growing regenerative and tissue engineering approaches. Some less complex, adjunctive and complementary polymeric approaches may provide avenues to expand the regenerative or tissue engineering solutions and provide discrete partial solutions to ongoing clinical issues. Haggard discussed a few polymeric approaches with degradable and non-degradable polymers for musculoskeletal clinical issues.

AOC donates polymer lab equipment

AOC, a global supplier of resins, gel coats, colorants and additives for composites and cast polymers, made a major donation of polymer processing lab equipment to the Department of Polymer and Fiber Engineering in 2006. For several years the company has been donating products for student use in our composite laboratories. The company's corporate office is in Collierville, Tenn.

ALUMNI

ATEF board expands with trustee emeritus membership

The Alabama Textile Education Foundation has expanded its advisory role with the Department of Polymer and Fiber Engineering at the request of department head Peter Schwartz. Trustees approved an amendment to the ATEF Constitution creating the membership designation "Trustee Emeritus." Trustee emeriti, who are nominated and voted upon by active trustees, are retired or former ATEF board members. They receive notice of meetings and may actively participate in any discussion as well as advise and counsel. Both active and emeritus ATEF board members now serve as the department's industry advisory board.

Several alumni were voted new members of the ATEF active board to serve the term 2007-2010: Steve Adair (TM 1970), retired senior vice president from Johnston Textiles in Valley, Ala.; Paul Brady (TC 1992), product development manager with American Nonwovens in Columbus, Miss.; Morris Collins (TE 1983), president of RKW-U.S. in Rome, Ga.; Charles Gavin, III (TM 1959), founder and board chairman of MFG Chemical in Dalton, Ga.; David Hall (TC 1958), professor emeritus of polymer and fiber engineering; and Scott Reams (TC 1992), market manager of broadloom and panel products for Milliken in LaGrange, Ga.

Other appointments for 2007-2010 include John Kochel, program manager of HondaJet Composite Fuselage with GKN Aerospace in Tallassee, Ala. David Gardner, human resource manager with VF Intimates in Monroeville, Ala., was reappointed to serve 2007-2010.

Dave Hornick, director of engineering and technology for GKN Aerospace, was appointed to fill a vacancy for the remainder of the term 2005-2008.

ATEF president for 2007-08 is Brian Owens (TMT 1990), senior merchant with Cargill Associates in Memphis, Tenn. Vice president is Kevin Horne, president and CEO of V2 Composites in Auburn. Terry Price (TM 1976), director of purchasing for WestPoint Home, serves as treasurer. The secretary is Julia Freeman, student services coordinator with the department.

ATEF board designates scholarship to honor William K. Walsh

Professor emeritus and retired department head Bill Walsh was honored at the ATEF board meeting and dinner with the designation of a scholarship in his name. The William K. Walsh ATEF Scholarship was awarded for the first time in 2007-2008. The first recipient is Matthew Gibbs, sophomore from Hayden, Ala. The ATEF board and the Department of Polymer and Fiber Engineering will seek endowment funds for the scholarship. Alumni and friends who would like to donate may send tax-deductible donations to ATEF, 115 Textile Building, Auburn University, AL 36849. Please designate the funds for the William K. Walsh Scholarship.

The ATEF scholarship program is the largest in the Department of Polymer and Fiber Engineering, with nine endowed scholarships and 20 general scholarships awarded in 2006-2007.



Walsh

2007 Outstanding Alumnus

David M. Hall was chosen as 2007 Outstanding Alumnus for the Department of Polymer and Fiber Engineering. Hall is professor emeritus in the department. He graduated from API (AU) in 1958 with a bachelor's degree in textile chemistry. He earned his master's degree in textile chemistry from Clemson in 1962, and a doctorate from Victoria University in Manchester, England, in 1964.

Author or co-author of six textbooks in his field, Hall is widely published in national and international journals. He pioneered methods to analyze the causes for consumer and manufacturing faults in textile products and has over 35 patents. He has consulted for over 200 companies and agencies and has been involved in numerous litigation efforts as an expert witness.

Hall was a reserve officer for 24 years in the U.S. Army Research & Development Command and presently holds the rank of colonel in the U.S. Army Retired Reserve.

In addition to being a professor revered by his former students, Hall has generously supported students and the department with time, energy and financial support throughout his career. Since retiring, he has endowed two ATEF David M. Hall Transfer Scholarships.



Hall receives a plaque from Dean Larry Benefield

Alumni News

Gary Boozer, P.E. (TE 1998) earned a master's degree in mechanical engineering from the University of Alabama in 2006. He is co-owner of Precision Engineering Solutions, LLC, based in Ralph, Ala. They provide machine design, OEM and consulting in lean and JIT manufacturing. Cary's e-mail address is sales@prengsolutions.com .

Daniel Butts, Ph.D. (TXEN 2000) is a materials engineer with Plasma Processes Inc. in Huntsville, Ala., developing high and ultra-high temperature materials for advanced rocket propulsion technologies. He earned a doctorate in materials engineering at Auburn in 2005.

Butts is currently working on two Phase I Department of Defense contracts. One contract was awarded by the *Aviation & Missile Research, Development, and Engineering Center* (ARMDEC), at Redstone Arsenal. This contract will focus on the development of dissolvable jet thrust vector control vanes for the U.S. Army's Precision Attack Missile (PAM). The PAM, developed by Raytheon, is a surface-to-surface attack missile that is effective against moving and stationary battlefield targets.

A Missile Defense Agency (MDA) contract will focus on the development and characterization of tantalum carbide (TaC) based materials for use as non-eroding solid rocket nozzle components. This technology has promise of improving performance and reducing cost for boost propulsion systems, such as the MDA's Strategic Missile-3 (SM3), Theater High-Altitude Area Defense (THAAD) System and Ground-Based Missile Interceptors.



Cook

Rochelle Cook (TMT 1995) has been named an ASQ-Certified Six Sigma Black Belt (ASQCSSBB) by the American Society for Quality. A senior process engineer with Sealy, Inc., in Greensboro, N.C., she earned her master's degree with a concentration in industrial engineering at North Carolina State University in 2004. In 2005, she earned her Lean Sigma Green Belt Certification. In 2006 she was designated a Certified Quality Engineer by the American Society for Quality.

Kaye Fetner Torgerson (TXEN 2001) is a manufacturing engineer with International Greetings in Savannah, Ga., designers and manufacturers of gift wrap, cards, stationery and accessories. Previously Torgerson was an engineer with Air Cruisers in Liberty, Miss., a producer of inflatable safety products including evacuation slides and slide rafts, life vests, life rafts and helicopter floats.

Charles E. Gavin, III (TM 1959), founder and board chairman of MFG Chemical in Dalton, Ga., is a member of the Samuel Ginn College of Engineering's Keystone Society. Those who make the highest commitment to engineering's annual fund are recognized by membership in the Keystone Society. These donors provide significant annual unrestricted funding that can address emerging opportunities, such as groundbreaking research start-up and timely support of student competition teams.

In addition, Gavin has endowed two Charles E. Gavin, III Honor Scholarships for students in polymer and fiber engineering through the ATE Foundation. He serves on the board of ATEF and was recognized as the 2002-2003 Outstanding Alumnus.

A member of AATCC since 1958, Gavin has served the organization with great distinction and dedication at the national and local levels, including president in 1999-2000. In 2002, he was recipient of the AATCC Chapin

Award for Outstanding Service to AATCC. He was instrumental in establishing the AATCC Foundation, serving as vice chair in 2001-2002. Gavin and his wife Carol Ann have endowed a scholarship through the AATCC Foundation, the Charles E. Gavin II Family Scholarship.



Charles and Carol Ann Gavin

Ian R. Hardin (TS 1965) is the Georgia Power Professor of Textile Science at the University of Georgia.

Andrew Hawkins, (TC 2000, M.S. 2003), works as an analyst with the State of Maryland Crime Lab. His specialties are arson and trace evidence. Some of his recent work has been with postage stamps used in evidence. In cases involving threatening letters sent through the mail, the old way to match stamps was from torn edges. Previous stamp matches were based on two or three torn edges and could not be used on pre-cut self adhesive stamps. Andy and a colleague devised a way to match self adhesive stamps using the fibers used in making the paper. Their new technique can identify 20 - 100 fiber matches on each side of the stamp.

Chris Spraggins (TM 1980) is vice president of sales - paper machine clothing, southeast, with Albany International, a leading supplier to the pulp and paper industry.

Abby Whittington Morgan (TXCH 2000) earned a doctorate in materials science in 2006 from the University of Illinois Urbana-Champaign. Currently she is working at the National Institute of Standards and Technology as a National Research Counsel Post-doctoral Fellow in Gaithersburg, Md. She has accepted a position at Virginia Polytechnic Institute and State University as a joint assistant professor in the Departments of Materials Science and Engineering and Chemical Engineering.

To submit alumni news for our newsletter, please email julia.freeman@auburn.edu.

FACULTY

Gisela Buschle-Diller has been promoted to full professor. She joined the department in 1995, after serving as a postdoc at the University of California-Davis. She served as an adjunct research assistant professor at UC Davis from 1995-99. Her areas of research and teaching are chemistry and applications of natural fibers and polymers, coloration and surface modification, electrospinning and biodegradable nanofibers.

Buschle-Diller established the AU-Reutlingen University Student Exchange Program, the first true student exchange program in the College of Engineering. She is currently working with two other universities in Germany to expand the program.

She is also involved with the first learning and living community for students in the colleges of engineering and science and math. She teaches sustainability to freshmen and coordinates the program for the College of Engineering.

Scott Parazynski, adjunct faculty member in the department and former emergency room surgeon, performed emergency surgery on a mangled solar wing during a 15-day mission that was one of the most challenging and historic in shuttle history. The seven shuttle astronauts and three residents of the international space station teamed up to plan, improvise parts and repair the solar wing. It was one of the most difficult and dangerous repairs ever attempted in orbit, but the future of the space station was at stake. Parazynski pulled it off in a seven-hour spacewalk.

From the beginning, the crew faced a complicated construction mission. They successfully installed a pressurized compartment named Harmony, moved a girder from one side of the space station to another, and inspected a clogged joint needed to turn the right-sided set of solar wings. But the flight took a dramatic turn October 30 when the crew unfurled the solar wings on the relocated girder on the left side of the space station. The first wing popped out fine, but the second one became snagged in a clump of tangled wires and ripped in two places.



Busche-Diller



Parazynski



The Outstanding Faculty Member for 2007, chosen by vote of our students, is Yasser Gowayed, who teaches introduction to polymer and fiber engineering, mechanics and composite courses in the department.

After flight controllers came up with a repair plan, Parazynski floated outside with wire cutters, pliers and some homemade tools and fixed the torn wing. No one had ever ventured so far from the safe confines of the space station before or worked right up against a solar wing coursing with more than 100 volts of electricity and swaying back and forth. He was propped on the end of a 90-foot extension beam that just barely reached the wing's damaged section. Astronaut Doug Wheelock was located at the base of the array, in charge of troubleshooting.

The repair -- hailed by NASA as one of the top all-time space saves -- allows the space agency to press ahead with the next shuttle flight to the space station.

This mission was also the first where both the Discovery and space station crews were commanded by women.

Excerpts from www.abcnews.go.com/Technology

For more details: <http://www.itwire.com/content/view/15178/1066>

<http://www.jsc.nasa.gov/Bios/htmlbios/parazyns.html>

STUDENTS

Grad student news

Tacibaht Turel earned first place in the 2007 National Textile Center (NTC) Graduate Student Competition in Hilton Head, S.C.

Local competitions were held separately at all NTC universities (Auburn, Georgia Tech, Clemson University, Philadelphia University, North Carolina State University, University of California-Davis, Cornell University, and University of Massachusetts-Dartmouth). Winners of these local competitions competed for the national award. Turel captured the award and received a \$1,000 cash prize.

Turel's presentation was entitled: "A Study of Gas Transport Through Chemical Protective Materials" and addressed concepts of gas permeation through layered materials as part of an overall effort by researchers at the Department of Polymer and

Fiber Engineering, in collaboration with the Department of Chemistry at AU, Clemson University and NovaComp, Inc., to develop active chemical protective materials for first responders.

A native of Turkey, Turel was also selected by the faculty as the 2007 Outstanding International Graduate Student in polymer and fiber engineering.

Polymer and Fiber Engineering graduate student **Rosary Stephen** was selected as one of two Outstanding Minority Graduate Students for the Samuel Ginn College of Engineering 2005-2006. A graduate of San Diego State University, Stephen is enrolled in the PFE master's program. Her research involves the investigation of enzymatic synthesis of dye molecules and coloration of various polymeric materials via enzymes. Gisela Buschle-Diller is her major professor.

Student spotlight

Polymer and fiber engineering senior **Shannon Haines** of Vestavia, Ala., was awarded the 2007 ATIE Scholarship for outstanding scholastic achievement, leadership, character and potential service to industrial engineering and the textile industry.



Turel

2006-2007 Student awards presented at the ATEF annual dinner last spring:

Jessica Dewberry, polymer and fiber engineering major from Alexander City, Ala.: Phi Psi Freshman Scholarship Award for 2005-2006.

James Waldrup, senior textile chemistry major from Opp, Ala.: 2006-07 Chattahoochee Valley Phi Psi Alumni Award; AATCC James C. Farrow Academic Award for Outstanding Junior in textile chemistry 2005-2006.

Kyle Del Piano, senior from Salisbury, N.C.: 2007 Alabama Textile Operating Executives (ATOE) Award.

Scott Terry, senior from Birmingham, Ala.: The Christopher B. Terry Service Award for 2006-2007; Phi Psi Senior Honor Award.

Nathan Smith, senior from Huntsville, Ala.: American Association of Textile Chemists and Colorists Student Award for excellence in the study of fiber chemistry throughout his or her college career; 2006-2007 Outstanding Senior Award; PFEN Student Engineer of the Year for 2006-2007.



2007 graduates Kyle Del Piano (left) and Nathan Smith worked on the department's second hovercraft for their senior research project.

PFE sophomore food drive director for 2006 Beat Bama Food Drive

Jessica Dewberry, a sophomore in polymer and fiber engineering from Alexander City, served as food drive director for the successful 2006 Beat Bama Food Drive. AU collected 172,492 pounds versus Alabama's 150,414 pounds, the largest quantity ever collected by the two universities in twelve years of head-to-head competition. The food was donated to the East Alabama Food Bank in Auburn and the West Alabama Food Bank in Tuscaloosa.

Congratulations to Jessica and all the students who worked hard at both universities!



Sophomore Jessica Dewberry served as Food Drive Director of AU's successful 2006 Beat Bama food drive.

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