



ENGINEERING NEWS

Solar Scholars program comes to Messiah engineering

At the invitation of the Sustainable Energy Fund (SEF) of Central Eastern Pennsylvania, Messiah College will participate this year in a pilot of the Solar Scholars program, an innovative new initiative to teach college students about solar electricity generation. The Solar Scholars program “provides university-level students in Pennsylvania in-depth, hands-on study, training and research in photovoltaics (or PV) — the use of solar cells to convert sunlight into electricity.” The Department of Engineering, the Collaboratory, and the faculty of environmental science are coordinating the program. As part of the program, Messiah engineering students will collaborate with other campus community members to



Messiah College students join others in learning about solar energy systems at Bucknell University as part of the Solar Scholars program.

TIPS FOR SAVING ENERGY IN YOUR HOME

Use compact fluorescent light bulbs. They fit the same sockets as regular incandescent bulbs, use $\frac{1}{4}$ of the electricity, and last up to 10 times longer.

Turn off the computer at night. A single computer consumes as much electricity as 6–10 60W light bulbs. Turning it off when you are not using it will save a lot of electricity.

Unplug “wall boxes” when they aren’t in use. Wall boxes, such as the kind that charge laptop computers and cell phones, are always using electricity when plugged into the wall—even if nothing is connected to them on the other side!

Turn out the lights. When you leave a room, switch the light off behind you.

design, build, and install a 3kW grid-tied PV system on Messiah’s campus this year.

The team is housed within the new Integrated Project Curriculum’s Green Energy group in conjunction with Dokimoi Ergatai’s energy group. The design team currently includes advisors Steve Frank and Earl Swope and student designers Jon Shambada, Clem Miller, and Anna Beiler. The team would like to recruit more participants in the fall semester. Steve works as the EE/CE technician for Messiah engineering. Earl is a Messiah engineering alum and former employee who now helps advise the DE energy group. Jon has three years of experience in the DE energy group working with PV systems. Clem and Anna recently completed an SEF-sponsored workshop in solar technology.

The workshop was held at Bucknell University this past August. Students from all six college participating in the Solar

Scholars program — Clarion University, Mercyhurst College, Pennsylvania State University, Villanova University, along with Messiah — were in attendance. Clem, Anna, and the other workshop participants learned about all aspects of stationary PV energy systems from two Solar Energy International (SEI) certified trainers. The participants also

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had a chance to network and discuss the future of energy in the USA and the world as well as the need to develop renewable, clean sources of energy.

As the fall semester began, the team’s focus shifted from training to design work.

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Chair's corner



Our department's theme for the year is "Innovation." Innovation is different from invention. Invention means to create something new, but does not require that anyone accept or adopt it. Innovation occurs when a group or community adopts a new idea, practice, or device and puts it to use.

This year the department begins a three-year transition from an invention — namely, the Integrated Projects Curriculum (IPC), to an innovative, fully adopted and utilized engineering curriculum. Another article in this newsletter highlights some of the IPC features. The class of 2010 will be the inaugural class for the IPC. The classes of '07, '08, and '09 will follow the existing engineering curriculum until the IPC is fully implemented.

I want to especially welcome the class of 2010 as they begin their studies here at Messiah College and also welcome back our sophomores, juniors, and seniors from a summer of work, mission trips, and rest. May the Lord's blessings be upon each of our students, faculty, and staff as the new academic year begins.

Professor Erikson
Chair, Department of Engineering

Reality and mission in the academy

by Daniel Dourte '04

Research: *verb, To search or search for again.* When I'm asked by a friend or stranger what I've been up to, I sometimes respond, "I'm searching again." What I mean to say is that I'm doing research. Maybe I reply this way to remind myself that anything I might discover is not entirely new. It may be new to professionals in my field or to others who might hear of what I have learned, but I'm not creating something new; I'm only seeking to find useful ways to describe what has been created.

I work as a graduate research assistant in the Agricultural and Biological Engineering Department of the University of Florida. My research, supported by some coursework, is in the area of irrigation and water resources. Working with a group of faculty and staff, I am measuring crop water use of Southern Highbush Blueberry plants in Central Florida. The goal of the project is to provide growers with useful information about crop water use to enable them to manage irrigation more effectively, possibly reducing water use and energy costs. Some ancillary study in the project includes evaluation of some different irrigation scheduling methods and soil systems for blueberry cultivation.

If I reflect on the foundations in engineering and discipleship I brought with me from Messiah College, what strikes me with the greatest force and inspires the most gratitude is the development and commitment to mission that I learned. The vision for education that describes engineering as "more than a major" encourages one to find and hang on to a sound reason for learning about something. So when rigorous coursework weighs heavily and advisors' demands are intimidating, I remember that there is rest for the weary if we try to wear the yoke of Jesus. I remember that maybe it's my mission to be better prepared to contribute to some good change in developing areas where vulnerable farmers are working towards increased land productivity and more secure livelihoods. Improving access to a water resource or utilizing available resources more effectively may help realize this mission. I remember clearly the shining faces and compassionate hearts at Messiah College that stir us to be missional about working and learning, and I feel deeply thankful.

Service for today. . . servant-leaders for tomorrow.

Since beginning their program in 1989, the engineering faculty have determined to teach responsible living and creative problem solving by enabling students to express value commitments and disciplinary knowledge through hands-on learning in real-life settings. One such activity began in January 1996 when an interdenominational mission-sending organization called SIM invited a four-person team, two professors and two students, to visit their work in West Africa and explore partnership opportunities. Following that visit, SIM Burkina Faso invited us to develop a solar power plan for a medical clinic in the rural village of Mahadaga. Student leaders of that first project team and their advisor dreamed of enabling projects of similar character in many academic disciplines, but as we began to consider additional projects we learned the importance of limiting the scope of our project activities to fit with the advisor, student, and funding resources at hand. We determined, therefore, to limit new projects to development of assistive technologies for the poor. This work grew in time into an organization of multiple application groups and one management group, taking the name "Dokimoi Ergatai" (DE), a Greek phrase that means "approved workers." It is taken from 2 Timothy 2:15, "Do your best to present yourself to God as one approved, a worker who does not need to be ashamed and who correctly handles the word of truth (TNIV)."

Whether serving the poor or working in industry, across the street or around the world, our goal in the engineering department is to honor God through excellence in our profession, and living as his stewards of the resources of the engineering discipline. So while DE was the name taken by one group, in the past decade the engineering faculty and students developed other hands-on learning activities of like character. These included the Genesis Solar Racing Team, the Messiah College Landmine Action Project, Water for the World, and Antenna Communications and Telemetry Systems. In 1999 this body of work gained the attention of the Harsco Corporation, a Harrisburg, PA engineering firm, and they made a lead grant to the College to form a center called *The Collaboratory for*

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Strategic Partnerships and Applied Research to coordinate the various projects. DE and its structure became an organization within the organization of the Collaboratory. In 2002 Dr. Ray Norman, dean of the newly formed School of Mathematics, Engineering, and Business (MEB), formed a Collaboratory Expansion Task Force to expand the scope of Collaboratory programming to serve the entire MEB School. New partnerships emerged with organizations like World Vision, PACTEC, and Hope International; and there were new projects, such as data base development, internal financial auditing and controls, and water access for persons with disabilities.

For some years the Collaboratory remained an informal confederation of faculty-sponsored projects and their student teams, with the organization DE comprised of an administrative Staff Group and Application Groups. The DE application groups maintained a knowledge base in their area and sponsored teams to complete projects with external partners, while the staff group provided administrative oversight and support services. In this way, DE developed support structures and services needed throughout the Collaboratory to promote quality, collaboration, and resource sharing between multiple project activities. DE also developed a culture of Christian discipleship shared throughout the organization. This summer, the director of the Collaboratory asked DE members to merge their structure and support services into the Collaboratory and to extend their identity and ethos as approved workers throughout the larger organization. This process was begun with the return of our student leaders this fall.

DE is ten years old this year, and has experienced continual growth and change since its inception in 1996. We are thrilled to have returned, thanks to God’s faithfulness and the support of many friends, to our early vision of connecting academics to Christian service in many disciplines. The Collaboratory is the organization that places students in a client-provider environment where they work alongside faculty members and other professional mentors. In fact, the Collaboratory is co-led by student leaders and the educators who mentor them. This year we have received new funding from the W. M. Keck Foundation, the Conrad Hilton Foundation, the Pennsylvania Sustainable Energy Fund, and through organizational partner World Vision. These resources will enable even more student participation, and beginning with the first-year students in the class of 2010, the integration of Collaboratory programming into the engineering curriculum.

If the Collaboratory is our structure, Dokimoi Ergatai is our ethos and the name of the community of students and their mentors who work and serve in the Collaboratory. We are Christians who wish to honor God as we develop academic and professional abilities, vocational vision for lifelong servant-leadership in Church and society, and courage to act on convictions. If you are an alum or friend of engineering at Messiah College we invite you to join us, either as a project sponsor or advisor, or by praying for us or providing financial support. Above all, we welcome new student members to our community of approved workers. It’s where your major is your ministry.

Dr. David Vader, Director of the Collaboratory

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The team hopes to have a complete design for the facility by November. Installation of the system outside of Frey Hall will begin in the spring semester and is scheduled to be completed before commencement in May 2007.

Once the solar training facility is complete, it will become a training facility for engineering students, Dokimoi Ergatai volunteers, and also students in a solar technology lab course that the college hopes to develop in the future. Besides providing a hands-on learning experience, over its life the system will generate over 100,000 kW-hours of electricity and result in more than \$10,000 of energy savings to Messiah College. Finally, the system will showcase clean energy technology to campus visitors and prospective students, such as the many school students who visit the Oakes Museum each year.

¹Quoted from SEF on their website: <http://www.theseef.org/aboutus/news/solarscholarspacollege.asp>

Program development grant received by the W.M. Keck Foundation

The engineering department joins with the School of Mathematics, Engineering, and Business (MEB) in thanking the W. M. Keck Foundation for funding a 3-year, \$300,000 grant to enhance hands-on learning in academic curricula. The Department of Engineering will be first in the MEB school to use these funds. Beginning with the incoming class of 2010, we are implementing an Integrated Projects Curriculum (IPC) that brings students and educators together on teams to engage classroom fundamentals in a client-provider environment. The IPC develops students’ professional abilities, their vocational vision for lifelong servant-leadership, and their courage to act on convictions.

For more than a decade, we have fostered hands-on learning through student projects in solar energy, bio-fuels, communication systems, water resources, and assistive technologies for the disabled. We also developed core strategies of the IPC, including shared project leadership by students and educators, vertical integration of students from all years of study, and continuity of effort between academic semesters. Traditional course work, the backbone of the engineering program, fosters depth of inquiry, and professional competencies. In the eleven-credit IPC students use academic knowledge to tackle real problems. They also learn to practice Christian stewardship of the resources of our profession while serving others in Jesus’ name.

Funds from the Keck Foundation will help with the transition costs of beginning a new curriculum, expanding project teams, and hiring support staff and student interns.

Integrated Projects Curriculum: an overview

The *Integrated Projects Curriculum (IPC)* in the Department of Engineering integrates cognitive, affective, and behavioral education through a seminar series and project courses. It imbeds the organizational structure, educational vision, and program strategies of the Collaboratory for Strategic Partnerships and Applied Research into a series of courses that both draw from and serve the rest of the curriculum. Traditional course work continues as the essential backbone of the curriculum, providing specialization that narrows students' attention to foster depth of inquiry, and focuses their time and work to develop professional competencies. The IPC helps students learn how to use special knowledge to tackle real problems. Seminar discussions run parallel to project engagement, both informing the work of project teams and drawing on them for reflection. This curriculum builds on

service-learning pedagogy, and it embodies the three modes of learning required for service-learning: content, engagement, and reflection. Organized under these headings the IPC seminar and project courses include the following elements:

Academic content

- Philosophical, cultural, and faith perspectives on engineering and technology
- Recognizing and understanding the role of culture in engineering design
- Approaches to work and vocation
- Engineering design process, teamwork, leadership, planning, and project management
- Historical, methodological, and content orientation to an IPC Group

Experience

- Express disciplinary knowledge and value commitments in an authentic setting

- Develop deep understanding by relating to people in the client organization or community
- Make decisions that reflect a service ethic, concern for justice, and desire for reconciliation
- Contribute to a long-term effort that achieves tangible results

Reflection

- Assess values and ethical traditions in light of the biblical witness
- Consider the role of faith in valuing and transforming culture
- Practice engineering as service and stewardship of the earth
- Explore faith and vocation in tension with popular American culture
- Foster vocational vision, direction, and commitment
- Nurture courage to act on conviction

Alumni news updates

By **Greg Holmes '97**

I was fortunate in the fact that I had a job before I graduated. Of course that job was as an officer in the Nuclear Navy. I had questions about whether my Messiah College education would hold up against MIT, Penn State, the University of Michigan, of course the Naval Academy and many others. The admiral who interviewed me for the nuclear program had stated that I seemed like a smart guy, so why did I go to Messiah College? He had never heard of it before. So although I had passed the technical interviews and was accepted into the program, I still had some doubts. Fortunately, my doubts were not well-founded. I found many extremely bright people out there in the real world, but I also learned that the education I received at Messiah prepared me well to compete with them. In fact, in many ways I had the advantage because I had received a great deal of personal interaction with my professors. Most of my colleagues were only able to interact with their professors when they were in very advanced engineering classes.

At Messiah we were able to benefit from our professors' experience from day one. Since leaving college I have worked as a submarine officer, a class officer at Naval Officer Candidate School, a financial planner, a graduate student, and presently as a senior nuclear operations instructor at Three Mile Island. In all of these activities, I have benefited from the foundation I received at Messiah College. Last summer I had the opportunity through my company to meet the same admiral who had interviewed me for the Naval Nuclear Program. I know he had interviewed thousands of candidates, so I figured he would not remember me. However, after I told him where I had gone to school, he remembered and said, "Oh yes, I made a good choice."

By **Craig Frey '04**

After graduating with an engineering degree (mechanical) in December of 2004, God directed me toward an agricultural internship in Florida. I spent a year at ECHO (Educational Concerns for Hunger Organization) learning about different systems, techniques, and crops for increasing

food production in the tropics—anywhere from the semi-arid climate to the rainforest. In addition to the agricultural training, I gained much insight on development, the poor, and the difficulties of being a subsistence farmer. Life is hard for the farmer, and the Fall has made our struggle great. Yet God created the earth to be fruitful, and man to work the land and take care of it. Creation longs to bring forth life, and by the grace of God he enables us to be good stewards, to manage and cultivate it well. God has continued leading me in the direction of agricultural development, and is now sending me forth to work with Lance (environmental science, '98) and Elizabeth (Nursing, '88) Edwards in northwestern Mozambique. I will be joining them through an organization called New Mission Systems International, and will be serving with the Edwards for two years. I will be traveling a thousand kilometers a month, teaching farmers a system of cultivation called 'Farming God's Way,' which relates biblical principles of life to the care under which creation thrives. Other items I will

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be teaching include utilizing the system of treadle-pump gardens and two different techniques for storing grain. Furthermore, I have been asked by the Edwards to raise additional support for experimenting with various appropriate technologies that present themselves as needs during my stay. Our hope is that the development work may be done well and may be pleasing in the sight of God. And our prayer is that as we go in obedience to what God has set before us, he will receive the glory that he deserves.

By Brendon Earl '05

It's been a year and a summer since I graduated from Messiah College. Currently, I work for the Manitowoc Crane Group in Shady Grove, Pa., as an engineer. I recently accepted the position to become the company's CAD administrator (I had been a contract engineer before that). As an engineer, I

spend much time sitting in a soft chair looking at a computer screen. So the difference between college and an actual job has been the promotion from a hard chair to a soft chair. Of course I'm joking. While I currently use only a small portion of what was taught at Messiah, I enjoy being able to use my skills to contribute to a common goal—making cranes (no, not the birds; the big metal machines). I could say a lot about the things that I've learned at my job, but then you might stop reading, so I'll share with you something that's been more significant to me.

At Messiah I became proud of my faith in Christ. The students and the faculty helped me get to that point. After college I lived in another town, with unfamiliar people and new responsibilities. I didn't want the worldly influences to deaden my wor-

ship of God. This is not something that I've conquered, but it's a daily challenge to listen and respond to the convictions of the Holy Spirit. I thank the Lord that he's put people in my life here to help me stay focused, like my roommate, Collins, whom I graduated with, and my girlfriend, Tracey, whom I met here. Right now “staying focused” seems limited to the places outside of work. Please pray that I'd be more attentive to God from 7 a.m. to 4 p.m. Monday through Friday. In light of these prayers, I'm excited to see his plans for me as I take on this CAD administrator role, and I look forward to whatever else is in the works.

By David Owen '97

In January 1998, after about a year and a half of preparation, I went with Dokimoi Ergatai (DE) on the first trip to Burkina Faso. Looking back, I see several things I

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What is SWE–SIG?



Left to right: Barbara Ressler (advisor), Stephanie Koplar '07, Liz Komline '09, Kelly Smith '07, Charity Oresic '09, Melissa Jamison '07, Emily Howell '10, Dawn Verlander '07, and Amy Bowie '09. Not pictured: Jennifer Clay '07, Mary Constantine '08, Michaela Sunberg '09, Joy Gallucci '09, and Lauren Sell '10.

SWE-SIG is a Society of Women Engineers (SWE) Student Interest Group (SIG), and one of Messiah's newest service groups on campus. It is run by some of the current 13 women engineering majors on campus and advised by Dr. Barbara Ressler. The purpose of the Messiah College chapter of SWE-SIG is to serve God through community fellowship and the expansion of engineering services. The team verse is “Love the Lord your God with all your heart and with all your soul and with all your mind.” This is the first and greatest commandment. And the second

is like it: “Love your neighbor as yourself.” “Matthew 22:37–39 This verse expresses the society's desire to love everyone through relationships and service.

SWE-SIG has some great plans for this upcoming school year. We plan to invest time designing and building a safety-regulated playground for The Silence of Mary Home, located in Harrisburg, Pennsylvania.

SWE-SIG will also tour Hershey Medical and discover the process of designing and testing the mechanical heart. Beyond

this, the ladies hope to host high school girls who are interested in engineering. This will give high-schoolers a chance to see what engineering is all about.

In the spring, SWE-SIG will hold a retreat that will give the girls a chance to see what is beyond the general engineering classes. There will be speakers talking about different types of engineering that can be pursued after college.

Of course, SWE-SIG believes in community amongst the girls. There will be plenty of team bonding including, engineering movie nights, Ultimate Frisbee, and other assorted outings. This group is committed to mentoring and tutoring other students within the engineering program.

In the future, SWE-SIG plans to continue their mission of building community and service. Hopefully, the society will be able to take on more service projects.

If there are any comments about SWE-SIG, please feel free to contact: Kelly Smith (ks1317@messiah.edu), Amy Bowie (ab1324@messiah.edu), or Barbara Ressler (BRessler@messiah.edu)

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OUR MISSION

The mission of Messiah College is to educate men and women toward maturity of intellect, character and Christian faith in preparation for lives of service, leadership and reconciliation in church and society. Graduates of the engineering program will therefore be technically competent and broadly educated, prepared for interdisciplinary work in the global workplace. The character and conduct of Messiah engineering graduates will be consistent with Christian faith commitments. We accomplish this mission through engineering instruction and experiences, an education in the liberal arts tradition, and mentoring relationships with students.

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learned from that trip that God has used again and again in my life. The goal of that DE project was to replace an aging diesel generator with a solar electricity generation system at a missionary clinic in Mahadaga, Burkina Faso (West Africa). The project provided practical experience on a real-world problem with financial and interpersonal challenges. Our task was not just to answer a question or even just to design a solution, but to propose options within a budget, get support from stakeholders with different perspectives, buy the parts, and build a working system in a location physically and culturally far from home. Several times along the way we (or at least I) failed in various ways and became discouraged, feeling like the project was just too difficult, but in the end I saw how the Lord can work through our weaknesses and through people around us to bring about his good purposes and his glory. It's wonderful to read about how DE has continued and grown since that time, expanding to include other kinds of technology and meeting people's needs in many places besides the town of

Mahadaga, where we went on that first trip. Since then I have experienced many ups and downs, spiritually and in terms of my education and professional life, but I look back now and see that God was always there, drawing me to himself, bringing growth, and using me to build up others around me.

Here's an update on what I've been doing the last nine years: after two years of working in the library at Messiah College, in January 2000 I moved to Morgantown, W. Va., and started graduate school in computer science at West Virginia University (WVU). I got a master's degree in 2002 after finishing a thesis on automated tools for software engineering. Actually, the research work at WVU was similar in some ways to our work on that first DE project, in which we used software tools to look for an optimal way of combining many components with adjustable parameters. Also in 2002 I attended the Summer Institute of Linguistics (SIL) program at the University of North Dakota (UND) in Grand Forks. This is a cooperative program between SIL, the aca-

demie side of the missionary organization Wycliffe Bible Translators, and UND. My decision to go to SIL was largely due to my experience in Burkina Faso, although the decision was also influenced by my parents, who have worked with SIL since I was in high school. Since 2002 I have continued to pursue my interest in linguistics and missions, along with my interest in computer science. I've attended SIL again each summer, as a student and then as a teaching assistant the past two summers. During the rest of the year I've worked on several NASA-funded research projects, on a part-time basis for a company called ProLogic at the NASA Independent Verification and Validation facility in Fairmont, W.Va., and also as a Ph.D. student in computer science at WVU. I hope to finish my dissertation this spring. Last but definitely not least, I married Gretta Yoder, from Berne, Ind., on December 18, 2004. We met at SIL in N.D. during the summer of 2003. She is interested in linguistics and missions also, and is now teaching fourth grade at Heritage Christian School in Bridgeport, W.Va.