

COLLEGE OF SCIENCE, ENGINEERING & TECHNOLOGY



2012-2013 State of the College & Annual Report

Overview

The College of Science, Engineering, and Technology (CSET) is home to nearly 2800 majors in addition to serving General Education needs of thousands of students across campus. The College offers almost 40 different undergraduate major and minor options, a variety of pre-professional program preparations and graduate programs in 10 academic departments. The College proudly houses all STEM (Science, Technology, Engineering and Mathematics) disciplines under one roof.

Our college faculty members are among the most productive on campus, producing roughly 28% of all on-campus generated credit hours and 25% of all general education credit hours, while our student-to-faculty ratio of 23.47 is the highest among all colleges on campus.

Our research output and connections to industry are similarly strong. We produce nearly half of the grants and contacts on campus (47%), with \$2.1 million in new FY13 awards, \$10.8 million in active awards, and \$3.3 million in pending awards (See [Appendix C](#) and [Appendix D](#) for many of our specific awards). As can be seen in [Appendix A](#), our faculty produces large amounts of publications in peer-reviewed journals and the faculty members are often invited for presentations at national/international conferences and workshops ([Appendix B](#)).

We continue to connect with alumni and industry to help serve the needs of our students. Our donations and in-kind equipment (many of whose impact are listed in the report below) totaled over \$1 million dollars last year.

The report that follows is organized by the strategic goals of the college. During the 2011-2012 academic year, new mission and vision statements and 4 strategic goals were developed for the college:

Mission

As educational leaders in science, technology, engineering, and mathematics (STEM), our accessible faculty advances student scholarship through innovative teaching, research expertise, and the exploration of new technologies and ideas. We prepare our students for professional careers and advanced study while connecting with local, regional and global communities.

Vision

We strive to provide a mentored educational experience to every student in our college; develop the most qualified engineers, scientists and STEM teachers; and establish our college as the preferred Master's degree provider in Minnesota.

Strategic Goals

- **Solutions**
 - Promote quantitative, technological and analytical solutions that focus on regional issues with global connections.
- **Teaching**
 - Transform Teaching and Learning by encouraging advanced, engaging teaching methods, classrooms and laboratories guided by effective assessment of student learning.
- **Exploration**
 - Explore and Enrich new and existing programs and scholarly initiatives.
- **Mentorship**
 - Provide a mentored educational experience to every student in the college.

During the 2012-2013 Academic Year, a workgroup of faculty was formed to develop an Implementation Plan to achieve those goals. One of the recommendations from that group was to link the annual reporting of the departments to the 4 strategic goals for the college. Therefore, below you will find a section for each strategic goal with subsections for each department's reported contribution towards that goal. The contributions of our departments to real-world thinking, collaborations with industry, research, and connections to our local and global communities are mostly found under the [Solutions Section](#). The [Teaching Section](#) addresses contributions to new pedagogy at the course level and classroom improvements (equipment, furniture, remodeling), while the [Exploration Section](#) addresses programmatic changes to and/or strengthening of our curriculum. [Mentorship](#) is broadly defined to include not only our large number of students engaged in mentored research, but also industry mentoring during internships and peer mentoring in our classes. Collaboration among our faculty, with faculty from other colleges on campus, with community college partners, with academic institutions beyond MnSCU, with industry, and with our students are infused throughout all four categories.

Additionally, out of the Implementation Workgroup emerged 8 Global Categories for Actions recommended to the Dean to address our needs and strengthen the college.

IMPLEMENTATION PLAN: GLOBAL CATEGORIES FOR ACTIONS

1. Faculty Reassigned Time
2. Prioritization for Resource Allocation
3. Reporting/Assessment
4. Publicity/Marketing/Recruitment
5. Advising/Mentoring/Professional Development
6. IFO Committees/University Policy
7. Outreach
8. Interdepartmental/Unit Communication

In the coming year, we begin the work of addressing these Global Categories. The linking of the strategic goals to specific actions and their linkage to the global categories can be found in [Appendix E](#). The specific actions include such items as methods by which we broaden faculty reassigned time to allow for outreach, curriculum development, pedagogy implementation and research. They also include actions by which CSET faculty might participate more fully in university governance and our general university students might obtain greater competencies in computational and analytical skills. A key point of emphasis for those actions culminates in Category 8, which encourages greater collaboration both within the college and among other units on campus.

Lastly, our college has seen a fair amount of transition over the past few months. We have begun the work of streamlining our processes and (re)-defining the Dean's staff roles to better align with serving our constituencies. In particular, with the addition of an Associate Dean position last February, we have begun the work of determining the best structure for the administration of the college. Our goal is to increase the coverage of our office to better serve faculty and students as well as meet the demands of increasing our external partnerships. Specifically, this position will improve our interface with our advisory boards, align our programs to workforce needs, partner with industry on projects that serve Minnesota and the region, extend our off-campus program success, and increase the internship opportunities for our students. As we transition to our new leadership model, we expect to be able to focus on our faculty needs so that they may use their expertise, energy and innovative ideas to further the mission of the college.

SOLUTIONS

Seek Solutions by promoting quantitative, technological, and analytical solutions that focus on regional issues with global connections.

Dean's Office/Student Advising Center

- *Patti Kramlinger, CSET Development Director, was awarded the Clair Faust Public Services Award for 2013.*
- *The Student Advising Center added the new position, Advisor for Pre-Professional Programs. This position will serve as the primary initial advisor for new students planning to pursue any of our pre-professional programs and will support existing as well as develop new programming and services for this population. This addition will help make faculty advising loads more manageable and will allow us to improve our support of these students from matriculation to graduation.*

Department of Automotive and Manufacturing Engineering Technology

- *Flies Fellowship awarded to **Dr. Kuldeep Agarwal** for 13-14 to work with industry during summer 2013 and academic year 2013-2014.*
- ***Dr. Gary Mead** continued research on the effects of ethanol on small engine. **Dr. Mead** served on the Minnesota Biofuels Taskforce to investigate new biofuel usage levels for the State of Minnesota.*
- ***Dr. Bruce Jones** served on the Minnesota Biofuels Taskforce to investigate new biofuel usage levels for the State of Minnesota.*
- *Flies Fellowship was awarded to **Dr. Jeffrey Doom** for 12-13.*

Department of Biological Sciences

- *Continued work to get the Lime Valley property to be the first outdoor education and research facility for MNSCU. **Dr. Brad Cook** (point of contact) for MSU Mankato with Lime Valley property donation from Mr. Brad Radichel and the subject of television commercial for Big Idea campaign in 2009-11, produced by MSU Mankato. Interview and online publication for "Ask an Expert" during 2012-2013 academic year, produced by the Minnesota River Basin Data Center. <http://mrbdc.mnsu.edu/dr-brad-cook>*
- ***Dr. Shannon Fisher** and Water Resources Center received University Recognition Award for Grants and Contracts*
- ***Dr. Shannon Fisher** oversees the restructuring of the Minnesota River Board.*

- **Dr. David Sharlin** recently began collaborating with **Dr. Guarionex Salivia** (Computer Information Science) at Minnesota State, Mankato. They will work with the American Thyroid Association to Develop iPhone and Android Applications that facilitate clinical thyroid management. **Dr. Sharlin** also began serving as member of the Trainee and Career Development Committee for the American Thyroid Associations (ATA) and is serving as Co-Chair for the Basic Science ATA Trainees' and Career Advancement Educational Track that will run concurrent with the Annual Meeting in October.
- 2012 **Patent number 8219189**, "Method and Apparatus for Improving Renal Function" based on electrical stimulation of the dorsal spine producing an increase in renal sodium excretion, awarded in August to **Dr. Penny Knoblich** and MSU.
- **Dr. John Krenz** was awarded 2013 **Excellence in Research**, given annually to one faculty member of the College of Science, Engineering, and Technology.
- Drs. Thomas A. Day, Ferran Garcia-Pichel and **Dr. Chris Ruhland** received Collaborative Research Grant (Photodegradation in deserts: litter optical and structural considerations) (Amount: \$217,954)

Department of Chemistry and Geology

- **Dr. Jeffrey Pribyl**, provided yearlong professional development activities for Hilltop Elementary School in Henderson, MN. This is a STEM school for all 4th and 5th grade students in the district. He provided information on both guided inquiry methods and content related to the 5th grade science standards. These sessions were held about once a month during the school year. Sessions lasted in length from two to four hours.
- **Dr. Lyuda Stackpool's** summer research project "Synthesis and XRD analysis of $Pb_{8-x}Na_2REEx(VO_4)_6O_x/2$ apatite samples, where REE = Nd, Eu, Sm, Pr, Gd" was conducted in June-July 2013 in collaboration with Donetsk National University, Ukraine. This project addresses a general scientific problem - the creation of materials with desired properties. Lead sodium vanadates with apatite structure, modified by REE can be used as potential solid oxide fuel cell electrolytes. However, their electrical properties are not widely studied and well understood. Therefore, the practical and specific fundamental task was to study the effect of synthetic conditions, chemical composition and crystal structure on the electrical properties of the lead sodium vanadates with apatite structure.
- **Dr. Steven Losh** continued work with ongoing research project "Oxidation and Silica Remobilization in the Mesabi Iron Range, Minnesota." Excess silica (SiO_2) in ore concentrate diminishes the quality of taconite pellets that are marketed to steel mills, and ultimately affects profitability of iron mining operations in Minnesota. This past year, he sampled additional locations on the Iron Range, analyzed the samples in terms of mineralogy, textures (using MSU's SEM) and geochemistry, and integrated these and previous results to produce a new model for oxidation and silica redistribution in iron ores that explains the nature and source of the problematic silica. This model has global applicability. This work was partly funded by MSU and

by Cliffs Natural Resources, which operates two iron mines in Minnesota.

***Dr. Losh** also continued work on a collaborative project with Prof. Mark Anders of Columbia University, collecting and investigating rock samples from nearly horizontal faults (breaks in rock across which there has been movement) in Nevada and Wyoming. Using a variety of techniques, we have documented that these particular faults behaved very differently than typical faults. These results are useful in understanding physics of earthquake processes, among other things.*

- ***Dr. Chad Wittkop** presented to the Friends of Minneopa State Park meeting in North Mankato on the Geology of Minneopa Park on April 18, 2013.*
- ***Dr. Chad Wittkop** contributed maps and descriptions to a Water Resources Center document on the Le Sueur River watershed last fall/winter.*

Department of Computer Information Science

- *Project Maverick (**Dr. Michael Wells**) received the 2013 Innovative Partnering and Collaboration Award – MnSCU Academic and Student Affairs Award for partnerships or collaborative initiatives that focus on better serving students of the 21st Century.*
- *The department has continued our relationship with HAN University, The Netherlands with students exchanged both directions between our universities.*
- *The Brown Technology Campus Cooperative, Project FPX and Project Maverick (**Dr. Michael Wells**) continue to provide students with opportunities to impact regional interests.*
- *Flies Fellowship was awarded to **Dr. Christophe Veltsos** for 12-13.*

Department of Construction Management

- ***Dr. Scott Fee** continued his work in South Africa, collaborating with South Central College for an international travel experience for students, as one example of several outstanding accomplishments during his travels.*
- ***Dr. Mohamed Diab** was appointed project manager for PMI-MN Southwest Outreach Program beginning of year 2013.*
- ***Dr. Brian Wasserman** worked with MnDOT on a state-wide initiative to implement Oracle Primavera P6 as a project management and scheduling platform.*
- ***Dr. Leah Roue** and two students participated with other regional CM programs on a tour of the National Environmental Laboratories in Colorado.*
- ***Mr. Matt Durand** (Adjunct) holds several volunteer positions:*
 - *Board Chair Cannon River Watershed Partnership.*

- *Committee Member - State of Minnesota Minimal Impact Design Standards (MIDS).*
- *Board Member - Minnesota Cities Stormwater Coalition (MCSC).*

Department of Electrical and Computer Engineering Technology

- ***Dr. Vincent Winstead** attended the HAWTech summer school in Germany as a participant and guest lecturer.*
- ***Dr. Vincent Winstead** provided an online/interactive lecture on Game Theory for the IUCEE (Indo US Collaboration for Engineering Education).*
- *Flies Fellowship was awarded to **Dr. Vincent Zhang** for 12-13.*

Department of Integrated Engineering

- *IRE student projects address real world problems. Of 18 completed projects this year, 9 were directly related to external industry clients, 1 was related to engineering competitions and 8 were related to engineering research projects or internal experiments for first semester students.*
- *Iron Range Engineering program was awarded full 6 year initial accreditation by the Accreditation Board of Engineering and Technology (ABET).*
- ***Dr. Rebecca Bates** was awarded a grant to develop computing research infrastructure for the field of automatic speech recognition. Her focus is on making tools and suggested curricula available to support undergraduate research at institutions like Minnesota State Mankato. The grant is in conjunction with collaborative leads Dr. Florian Metze at Carnegie Mellon University and Dr. Eric Fosler-Lussier at the Ohio State University.*
- *For the 4th year in a row, the department hosted a test site for the North American Computational Linguistics Olympiad, encouraging junior high and high school students to think about ways they can use computational tools to address problems related to language, translation and communication with quantitative tools. The top 10 in the nation represent the United States at the International Computational Linguistics Olympiad, but all students learn that this is a potential career area.*
- *The IE Department continues to work to address the regional need for workers trained in the field of computer science, a key area for developing computational, technical and quantitative solutions to regional, national and global problems. One way has been through the development of a computer science minor.*
- ***Dr. Rebecca Bates** received the NSF Director's Award for Collaborative Integration for her work with the CS Bits & Bytes outreach team at the National Science Foundation.*

Department of Mathematics and Statistics

- *The Department has designed an on-line STAT 154 course to be offered to incoming nursing majors. This course will be offered for the first time during summer 2014.*
- *The Department has continued to work closely with the College of Education and junior colleges in the Twin Cities area to promote SEAL (Secondary Education Amplified Licensure), a joint venture with these institutions of offer a Mathematics Secondary Licensure Program to Twin Cities area residents*
- *The department's new minor in Actuarial Science, developed in collaboration with the College of Business, provides a viable career option for our students and addresses a need for financial institutions in our state.*
- *The Department is offering an Extending Learning class in New Ulm during Fall 2013.*

Department of Mechanical and Civil Engineering

- *Student teams entered several design competitions demonstrating their engineering skills; PCI Big Beam Contest (2nd place finish for Zone 3, first-ever entry by MSU), ASCE Concrete Canoe Competition (3rd place overall, Midwest Region), ACI Fiber Reinforced Polymer Composite Competition (9th in the nation), ASME Regional Student Design Competition (two teams).*
- *The mechanical engineering seniors completed seven capstone projects during 2012- 2013. Five of the projects involved designing products or equipment for local companies such as Emerson, Johnson Outdoors, and MTU Onsite.*
- *Several research projects have benefited local communities. Of particular note is "Flood Mitigation Study of the Zumbro River Watershed, Minnesota" which has involved 14 undergraduate students and presentations in three Minnesota communities.*
- *The Engineers Without Borders (EWB) chapter continued to work on their service project and traveled to El Salvador over winter break. This interdisciplinary group is now recruiting both engineers and non-engineers.*

Department of Physics and Astronomy

- *Phys 417, biophysics, was taught for the first time in 15 years with updated content. The course serves as a bridge over the gap between introductory physics and the application of physics in life science, biomedical sciences and biomedical technology. We feel this course is needed since more and more modern medical equipment and treatment are used in our health care system.*

- *The two astronomy professors in the department (**Dr. Paul Eskridge and Dr. Steve Kipp**) together with the help of student assistants, held more than 10 viewing sessions in the Standeford and Andreas observatories for the general public in the community. Almost 1200 people visited the observatories during these sessions.*
- *The department gave its Special Physics Award to the best physics project in the regional junior and senior high school Science Fair.*
- ***Dr. Paul Eskridge** was interviewed by Pete Steiner at KEYC TV.*
- ***Dr. Russell Palma** won the university's Distinguished Faculty Scholar award.*

TEACHING

Transform Teaching and Learning by encouraging advanced, engaging teaching methods, classrooms and laboratories guided by effective assessment of student learning.

Department of Automotive and Manufacturing Engineering Technology

- *Received \$210,000 software gift for simulation of manufacturing processes. Received Rapid Prototyping machine from X1 for 1-year (lease-free), subsequently donated (Future value \$150,000). Both will be used to train students on rapid prototyping/injection molding/3-D printing.*

Department of Biological Sciences

- *In Biol220 Human Anatomy, we implemented Connect On-line coursework and study materials. Initial analysis indicated that lecture exam scores increased, depending on exam, up to 5%.*
- ***Drs. Bethann Lavoie, Brittany Ziegler and Ms. Stephanie Zojonc** implemented and assessed the effects of Process Oriented Guided Inquiry Learning (POGIL) on pre-service elementary teachers (Biol 480 students).*

Department of Chemistry and Geology

- ***Dr. Jeffrey Pribyl** continued to utilize a multitude of engaging teaching methods in all classes he instructed. This included the use of POGIL (Process Oriented Guided Inquiry Learning) methods, a variety of group learning methods and new this year was in incorporation of Plan 426, a method used to encourage students to engage with homework on a regular basis, not only individually, but also with their group members. Chem 100 laboratories continued to use a variety of engaging group methods to collect, analyze and communicate data and conclusions.*
- ***Dr. Lyudmyla Stackpool** conducted five POGIL (Process Oriented Guided Inquiry Learning) sessions with General Chemistry I and General Chemistry II students: "Molarity", "Hess's Law", "Partial Pressure", "Molecular Structure", "Electrochemical Cell."*
- ***Dr. John Thoenke** worked with MSU undergraduate researcher Megan Clafin to develop and implement a new experiment for the the physical chemistry lab course, investigating the spectroscopic, photophysical, and photochemical behavior of compounds that serve as active ingredients in sunscreens. This provides the students an opportunity to use multiple perspectives to study compounds of practical significance. Megan presented this work in a poster at the ACS meeting (see below) and received a good deal of positive feedback. We plan to submit a manuscript to the Journal of Chemical Education (or similar) once this experiment has been used in class again.*
- ***Dr. Danaè Quirk Dorr** received the Pedagogical Innovation Award from the College of Extended Learning.*

- *In GEOL 330 Structural Geology class, Dr. Steven Losh merged lab exercises with three out-of-class projects based on real-world situations (gold exploration, earthquake hazard assessment, and oil exploration). Students worked in groups to prepare reports on their findings, backed by all relevant work; their integration and mastery of the material was evident in their products.*
- *The American Chemical Society (ACS) has recently changed their guidelines and in light of those changes the department has revised its chemistry courses and redesigned a number of programs. The new programs will begin in 2014-15 with the revision of many courses and the implementation of several new courses.*

Department of Computer Information Science

- *The department completed construction of our Active Learning Classroom (WH 283) that provides an excellent environment for classes that require students to work in groups/teams.*
- *The department completed a Program Review and have received confirmation of our effectiveness and suggestions of how to make changes to curriculum and programs to meet future challenges.*

Department of Construction Management

- *The CM program raised over \$175,000 (through Strategic Priority Funding, FY14 Institutional Requests, and industry partner matching) to create a collaborative classroom in Wiecking Center. The room was remodeled over the summer and is now fully functioning.*
- *Created three hybrid courses for CM, the first step into online teaching.*
- *The CM commitment to project based learning continued with student participation in many real time projects. Included were:*
 - *Green Infrastructure – MSU Parking Lot Reconstruction Project*
 - *Future Highway 22 design and estimate for St. Peter*
 - *Work with Emerge Construction, a Disadvantaged Business Enterprise in the Twin Cities*

Department of Electrical and Computer Engineering Technology

- *Provided multiple graduate engineering courses taught concurrently on the Mankato campus and through the Interactive TV (ITV) system.*
- *Expanded capability of existing communication laboratories to allow for enhanced analysis of high frequency signals.*

- *Remodeled PLC/Automation laboratory and received new equipment from industry partner (Beckhoff).*

Department of Integrated Engineering

- *Iron Range Engineering participated in deep assessment through our ABET accreditation visit and subsequent accreditation of the program. This is the first time a 100% project-based learning engineering program has been accredited.*
- *Integrated Engineering has a core value of continuous improvement. In our innovative practice of project-based learning, we use regular faculty workshops and meetings to reflect on and improve the implementation of our pedagogy.*
- *The department began to build capacity for K-12 teacher education in computer science by developing and presenting a summer workshop for K-6 teachers. The hands-on, project-motivated workshop addressed the capabilities and uses of a software teaching tool, Squeak Etoys. While this tool is well known in the CS education community, it is relatively unknown in the teacher training programs at many MnSCU institutions. The tool can be used to teach students about computing or for teachers to develop innovative, interactive approaches to teaching academic content.*
- *The department supports the disciplines of automotive engineering, computer engineering, cognitive science, electrical engineering, manufacturing engineering, mathematics, physics, statistics and others with solid foundational courses in algorithmic problem solving.*

Department of Mathematics and Statistics

- *An eBook format has been adopted for MATH 130 and MATH 098. The eBooks save the students money and make available to them a multitude of online resources. In partnership with Academic Affairs, the department joined a consortium of institutions to join a Gates Foundation Grant to implement a system of interventions in MATH 098 to inform students of topics they need to review, and provide the student with resources for overcoming their deficiencies. When the system detects a student is falling behind, an alert is sent to the instructor who in turn alerts the student, and together they form a corrective response.*
- *The Department has required all calculus students to be enrolled in Enhanced WebAssign. Enhanced WebAssign is a powerful online instructional tool for faculty and students. Instructors create assignments online within Enhanced WebAssign and electronically transmit them to their class. Students enter their answers online, and Enhanced WebAssign automatically grades the assignment and gives students instant feedback on their performance.*
- *The Department has developed an online STAT 154 course to be delivered in the summer of the 2013-2014 academic year.*

Department of Mechanical and Civil Engineering

- *Grants were received from MNCEME for “Building Engineering Connections during the Sophomore Year” and the ENGAGE program for “Engaging Students: Everyday Examples in Engineering (E^3)”. Both grants will target student engagement and retention in the freshman and sophomore years.*
- *Several lab/classroom improvements were made. Through department purchases and transfers from MSU surplus the 7 year old computers in the TE216 lab were updated, and all computers in labs and resource rooms (which were 9-10 years old) were replaced with “newer” models. A 3D printer was added to the ME Special Projects Lab (TE317) and IT was consulted about adding/improving A/V capabilities in several lab/classrooms. Design services were donated by I&S to remodel the Civil Resource room (TN377) into an industry level design space.*
- *Assessment activities continued on schedule with assessment data collected from students, instructors, and industry representatives. An Interim accreditation report was submitted to ABET in June 2013.*

Department of Physics and Astronomy

- *We constantly update and improve our laboratory manuals, teaching materials and methods. More faculty are using D2L and other online tools in their courses for homework, quizzes, posting grades, and communicate with students.*
- *The department purchased and installed over 50 new computers in the introductory physics laboratories. These new computers are used by students for data acquisition and analysis.*
- *The department purchased new equipment (6 Geiger tubes, 6 lead shields and stands for sodium iodine detector, 4 NIM timers and counters, and one Caberra Digital Signal Processing Device) for our nuclear physics laboratory which serves physics majors and minors taking Modern Physics II course.*
- ***Dr. James Pierce** won the CSET award for the Excellence in Teaching.*

EXPLORATION

Explore and Enrich new and existing programs and scholarly initiatives.

Dean's Office/Student Advising Center

- *The CSET Student Advising Center updated our orientation procedures and programming for NEF, Transfer and International Orientation to increase focus on those elements most important to the initial success of our new students.*

Department of Automotive and Manufacturing Engineering Technology

- *Developed curriculum for PSM program in Engineering Management (launches Spring 2014)*
- *Developed graduate certificate programs in "Quality Management Systems" and "Project Management."*

Department of Biological Sciences

- *Strongly advocated the need for a Pre-Professional Advisor to serve an important, large segment of the Biology and Chemistry majors (pre-med, pre-pharm, etc). The department has helped transition the new advisor into her role.*

Department of Chemistry and Geology

- *Descriptive Main Group Chemistry (chem. 316) is part of an overall funded proposal "Redesign of Chemistry Programs". As a co-PI on this funded proposal **Dr. Lyudmyla Stackpool** designed a laboratory component for Chemistry 316 together with graduate student Ronni Etterman.*
- *Over the past year, **Dr. Steven Losh** successfully proposed and largely prepared a new course, GEOL 430/530 Petroleum and Ore Deposits Geology, an elective in the Geology Option of the Earth Sciences BS major. The course's purpose is to better prepare our graduates for careers in the booming petroleum and minerals industries.*
- ***Dr. Bryce Hoppie**, developed the curriculum and led the TIMES XIV, extended educational experiences for secondary science teachers from June 25 to June 27.*
- ***Dr. Bryce Hoppie** provided (pro bono) scientific consulting services to the Lake Titlow Committee/Sibley County Soil & Water Conservation District throughout the year.*
- ***Dr. Theresa Salerno and Dr. James Rife** held a field trip for Kennedy School second graders entitled, "Solids, Liquids, and Gases and the Scientific Method." **Drs. Salerno and Rife** developed*

a chemistry experiment call Chemical Clue. In this activity, the students did paper chromatography to determine who wrote a note found at the crime scene.

Department of Computer Information Science

- *The department coordinated with IT Services to provide employment opportunities for our graduate students. These students receive valuable experience and IT Services has additional support for their myriad of projects.*
- *The CIS graduate program has continued to expand and currently has over 30 students.*
- *The department received authorization and have proceeded with the design of a Professional Science Masters (PSM) in Data Security and Risk Management.*

Department of Construction Management

- ***Dr. Leah Roue** began the first Building Information Modeling (BIM) classes at MSU. BIM combines design, scheduling, estimating and facilities management into a single computer model that is used for improving communication and decreasing errors on construction projects.*
- ***Dr. Mohamed Diab** began an equipment management class.*
- ***Dr. Brian Wasserman** introduced the concepts of Risk Assessment into the advanced estimating course.*

Department of Electrical and Computer Engineering Technology

- *Engaged partner university in the Netherlands, HAN University, in planning for graduate level short course in automotive technology as part of visit in 2014.*
- *Developed new engineering curriculum elective content in Power Electronics.*

Department of Integrated Engineering

- *The department successfully reinstated the Computer Science minor to offer all CSET students the opportunity to connect their major learning to the quantitative, algorithmic skills that come with studying computer science.*
- *The department started the Twin Cities Engineering program in partnership with Normandale Community College.*

- *Dr. Rebecca Bates developed and led a workshop for mid-career engineering education researchers to support professional development and to build a national community of practice across universities. This work was done in conjunction with Dr. Lisa Benson of Clemson University and was supported by the National Science Foundation.*

Department of Mathematics and Statistics

- *The Department has hired a new faculty member whose specialty is Stochastic Processes. This adds a new dimension to the department's offering and brings added value to a number of our existing programs such as applied mathematics, statistics and actuarial science.*
- *The Department has hired a new faculty member whose specialty is Geometry. The new faculty member will be able to offer a number of graduate level and undergraduate level courses in geometry never offered before in the Department.*
- *A minor in actuarial science was developed in collaboration with the College of Business and approved.*
- *A master's degree in Applied Statistics was approved.*

Department of Mechanical and Civil Engineering

- *A MSU Strategic Priority Initiative Grant was received to develop curriculum proposals for an undergraduate minor and graduate certificate in "International Engineering". The goal is to provide a better pathway for MSU and international students to receive experience in working globally.*
- *As part of the routine assessment process several curriculum modifications were discussed. Of particular note, courses in both mechanical and civil engineering were approved for conversion to Writing Intensive (WI) courses.*
- *The department continues to be active in statewide Project Lead The Way (PLTW) efforts aimed at encouraging students to pursue engineering and STEM disciplines. Faculty attended Mankato PLTW Advisory Committee meetings, state PLTW Affiliate meetings, and national tele-conferences for PLTW faculty and advisors.*

Department of Physics and Astronomy

- *The department faculty took physics students to visit the University of Minnesota's magnetic research labs. A faculty also took the students in the Physics Club to visit Ames National Laboratory in Ames, Iowa.*

- *The department maintained its Physics Seminar Series. Besides our own faculty, emeritus professor and students, we invited 10 outside speakers to give research colloquium.*
- *The department constantly re-exam the curriculum for physics majors. We updated course descriptions of several upper-division physics courses. We also added two prerequisites (Math 247 and CS 110) for our majors in order to better prepare them for upper division courses. We have written learning outcomes for all of the upper division physics courses. We completed our astronomy teach-out plan for astronomy majors, and updated the requirements for astronomy minors.*

MENTORSHIP

Model Mentorship by providing a mentored educational experience to every student in the college.

Dean's Office/Student Advising Center

- *The CSET Student Advising Center implemented new programming and outreach strategies for students on academic warning/probation.*

Department of Automotive and Manufacturing Engineering Technology

- ***Dr. Gary Mead** served as the faculty advisor for the 2013 Formula SAE team.*
- ***Dr. Gary Mead** attended the 2012 Society of Automotive Engineers Small Engines Technology Conference in which an AET student (Max Anderson) presented work that he had performed while working on the small engines ethanol project at MSU with **Dr. Mead**.*

Department of Biological Sciences

- ***Drs. Chris Conlin, David Sharlin, and Marilyn Hart** were awarded MSU Students Honors Mentor Award.*
- ***Dr. Geoff Goellner** was awarded MSU Best Advisor/Mentor.*
- *Jessica Nelson, mentored **by Dr. Shannon Fisher**, was McNair Scholar of the Year.*

Department of Chemistry and Geology

- ***Dr. Jeffrey Pribyl** continued to work with Nick Miron, a mechanical engineering major on work related to readability of thermodynamics textbooks as well as web pages.*
- ***Dr. John Thoenke** mentored 7 undergraduate research students during the year; 3 students presented at the ACS national meeting in April 2013, 3 students presented at MSU's Undergraduate Research Symposium in April 2013, 1 student presented at The ACS Great Lakes Regional Meeting in June 2013. Two students applied for and received MSU URC funding. (Details of external presentations are given below.)*
- *During the 2012-13 academic year, **Dr. Steven Losh** mentored one student, Ryan Rague. He carried out URC-funded research on the iron ore project (above), gave an oral presentation at the national Geological Society of America Conference in Charlotte NC in November 2012, and presented the work at MSU's URC, the MnSCU Research symposium, and at NCUR in Lacrosse WI. He is also co-author on a peer-reviewed manuscript on the Iron Range research.*
- ***Dr. Mary Hadley** mentored two students who wished to do undergraduate research. In one project, the student is working with **Drs. Hadley** and Visser (Human Performance) in an*

*investigation of the effects of creatine on memory and muscle strength in women 55 to 80. A second student is working with **Drs. Hadley**, Bissonnette (Consumer Family Science) and **Knoblich** (Biology) on a research project which is designed to investigate the effect of select artificial sweeteners on body mass.*

Department of Computer Information Science

- *All students in both the Computer Information Technology and the Information Systems programs are required to have an internship to provide experiences to ensure they are prepared for employment in a typical corporate IT department.*
- *Under faculty mentorship, students participated in the Minnesota Collegiate Cyber Defense Competition and placed 2nd in the competition.*

Department of Construction Management

- ***Dr. Brian Wasserman** created a student/alumni work group in the MnDOT Enterprise Project Management Section.*
- ***Dr. Leah Roue** led student estimating competitions for the National Association of Home Builders and the Associated Schools of Construction.*
- ***Dr. Leah Roue** and two students participated in a regional.*
- ***Mr. Matt Durand** and **Dr. Brian Wasserman** mentored groups in the Undergraduate Research Conference.*

Department of Electrical and Computer Engineering Technology

- *Provided for frequent individual as well as bi-annually scheduled individual and group advising for course selection and career planning.*
- *Facilitated multiple internship experiences with local industry for undergraduate engineering students and undergraduate engineering technology students.*
- *Undergraduate Research Conference participation - two students received grants from Minnesota State Foundation and Undergraduate Research Supply.*
- *IEEE student chapter and IAB member sponsored Engineering Career Fair.*

Department of Integrated Engineering

- *Fostering student-motivated, student directed learning is another value of our department. All students in our major programs experience significant mentoring through their project-based experience.*

- *Industry clients serve as irregular mentors throughout the semester and school year, by giving feedback and supporting student development with a perspective different from that of faculty mentors.*
- *Faculty regularly supports student research that is formally presented at the Undergraduate Research Symposium and National Conference on Undergraduate research. In 2013, 13 students presented 7 different projects at the URS and one student presented at NCUR. The projects were supervised by four faculty mentors. Two projects were recognized with Minnesota State Mankato Foundation grants and one project received a best presentation award.*
- *For all practical purposes we have completed the university administration's program to get rid of students who intended to major in Computer Science. For students who started the program as first-year students and choose to remain in the computer science program, we have mentored them individually to address their unique advising and degree completion needs. The majority of these students have now completed their degree requirements, and we continue to mentor the students who have their last few classes to complete.*

Department of Mathematics and Statistics

- *A number of students throughout the College attend the Department's weekly Math Club meetings.*
- *A number of students throughout the College attend the Department's weekly SAMER meetings. The mission of the Student Association for Mathematical Experiences in Research (SAMER) is to provide students with an opportunity to perform mathematical research through interaction with faculty members and other students.*
- *The 2012-2013 academic year was the grand opening of the Mathematics and Statistics Learning Center that provides tutoring to students throughout the College and University.*

Department of Mechanical and Civil Engineering

- *Faculty served as advisors for several student organizations; Society of Women Engineers (SWE), American Society of Mechanical Engineers (ASME), American Society of Civil Engineers (ASCE), American Society for Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Engineers Without Borders (EWB), and the National Society of Black Engineers (NSBE). Faculty also served as faculty advisors for a freshman engineering learning community (Alpha Engineering) and proposed a sophomore engineering learning community (Omega Engineering) for AY2013-14.*
- *Faculty advised numerous senior project teams and undergraduate research activities (most mentioned under previous bullets). Pre-registration advising was completed for all declared mechanical and civil engineering student Fall and Spring semesters.*

- *Student organizations were active in mentoring pre-college students. Activities included assisting with the Latino Engineering and Academic Day (LEAD), Mathcounts, and Rube Goldberg. The Society of Women Engineers (SWE) organized a Girl Scouts Engineering Patch Day for the Mankato Girl Scout troop.*

Department of Physics and Astronomy

- *With 25% less faculty in the department, we did our best to accommodate students who needed to take our service courses. At the meantime, we enforce our prerequisites for all 200-level courses in order to help the students to succeed in physics courses.*
- *The department faculty keeps the physics tutoring room staffed for at least 14 hours per week during regular semesters. The faculty in the tutoring room helps students who are taking 200-level physics courses.*
- **Dr. Youwen Xu** *won the CSET award for the Excellence in Student Advising.*

Appendix A: Publications

Dr. Kuldeep Agarwal published papers in Forging Industry Association Conference and also in Society of Manufacturing Engineer's conference.

Dr. Kuldeep Agarwal published 2 journal papers, one in Journal of Intelligent Manufacturing and another in Journal of Materials Processing Technology.

B.J. Butterfield^{1,2}, L.A. Cavieres^{3,4}, R.M. Callaway⁵, **B.J. Cook⁶**, Z. Kikvidze⁷, C.J. Lortie⁸, R. Michalet^{9,2}, F.I. Pugnaire¹⁰, C. Schöb¹⁰, S. Xiao¹¹, B. Zaitchek, F. Anthelme^{12,13}, R.G. Björk¹⁴, K. Dickinson¹⁵, R. Gavilán¹⁶, R. Kanka¹⁷, J.-P. Maalouf⁹, J. Noroozi¹⁸, R. Parajuli¹⁹, G.K. Phoenix²⁰, A. Reid⁸, W. Ridenour²¹, C. Rixen²², S. Wipf²², L. Zhao²³, R.W. Brooker²⁴. (2013). Alpine cushion plants inhibit the loss of phylogenetic diversity in severe environments. *Ecology Letters*, 16: 478-486.

L. Marchanda, M. Mencha, F. Nsanganwimana^{a,b}, Y. Vystavnac^d, F. Huneauc, P. Le Coustumerc, J.B. Lamya, **B.J. Cook**. July 2012. Macrophytes as biomonitors of trace element exposure along an urban river using a multimetric approach (Jalle d'Eysines River, France). Submitted to *Freshwater Biology*.

B.J. Butterfield^{1,2}, L.A. Cavieres^{3,4}, R.M. Callaway⁵, **B.J. Cook⁶**, Z. Kikvidze⁷, C.J. Lortie⁸, R. Michalet^{9,2}, F.I. Pugnaire¹⁰, C. Schöb¹⁰, S. Xiao¹¹, B. Zaitchek, F. Anthelme^{12,13}, R.G. Björk¹⁴, K. Dickinson¹⁵, R. Gavilán¹⁶, R. Kanka¹⁷, J.-P. Maalouf⁹, J. Noroozi¹⁸, R. Parajuli¹⁹, G.K. Phoenix²⁰, A. Reid⁸, W. Ridenour²¹, C. Rixen²², S. Wipf²², L. Zhao²³, R.W. Brooker²⁴. Foundation species neutralize a global productivity – phylogenetic diversity relationship across alpine plant communities. Submitted to *Ecology Letters* 7/12.

Lohengrin A. Cavieres^{1,2}, Rob W. Brooker³, Brad J. Butterfield^{4,5}, **Bradley J. Cook⁶**, Zaal Kikvidze⁷, Christopher J. Lortie⁸, Richard Michalet⁹, Francisco I. Pugnaire¹⁰, Christian Schöb³, Sa Xiao¹¹, Fabien Anthelme^{12,13}, Robert G. Björk¹⁴, Katharine Dickinson¹⁵, Brittany Cranston¹⁵, Rosario Gavilán¹⁶, Alba Gutiérrez-Girón¹⁶, Robert Kanka¹⁷, Annika Korsten¹⁵, Jean-Paul Maalouf⁹, Alan Mark¹⁵, Jalil Noroozi¹⁸, Rabindra Parajuli¹⁹, Gareth K. Phoenix²⁰, Anya M. Reid⁸, Wendy M. Ridenour²¹, Christian Rixen²², Sonja Wipf²², Liang Zhao²³, Adrián Escudero²⁴, Benjamin F. Zaitchik²⁵, Erik T. Aschehoug²⁶, Ragan M. Callaway²⁶. Positive biotic interactions affect global alpine plant diversity as much as climate and sustain it under harsh conditions. Submitted to *Science* 8/12.

Lucas J. Wandrie¹, John D. Krenz², Philipp Nagel³, and **Bradley J. Cook²**. Influences of adjacent land-use on avian community structure in sub-boreal peatlands of the Midwest. In prep to be submitted to *Urban Ecosystems* by 9/12.

Christian Schöb^{1,2*}, Richard Michalet³, Lohengrin A. Cavieres^{4,5}, Francisco I. Pugnaire¹, Rob W. Brooker², Bradley J. Butterfield⁶, **Bradley J. Cook⁷**, Zaal Kikvidze⁸, Christopher J. Lortie⁹, Sa Xiao¹⁰, Brittany Cranston¹¹, María-Carolina García^{4,5}, Yoan Le Bagousse-Pinguet³, Peter C. le Roux¹², Emanuele Lingua¹³, J.-P. Maalouf³, Mawethu Nyakatya¹⁴, Blaise Touzard³, Liang Zhao¹⁵ and Ragan M. Callaway¹¹. The cost of facilitation: a global study of the fitness responses of alpine cushion plants to their beneficiaries.

Wheelock, S., **T. E. Secott** and **B.J.Cook**. *A plant/soil feedback mechanism for the invasiveness of Phalaris arundinaceae*. In revision for re-submission to *Journal of Plant Ecology*.

Cook, B. J., K. Clement, and C. Noble. *In prep*. A Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Peatlands of the Upper Midwest. In preparation for publication as a U.S. Army Corps of Engineer Technical Report.

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Lee GS, He Y, Dougherty E.J., Jimenez-Movilla M, Avella M, Grullon S, **Sharlin D.S.**, Guo C, Blackford J.A., Awasthi S, Zhang Z, Armstrong S.P., London E.C., Chen W, Dean J, Simons S.S. Disruption of Ttll5/Stamp gene (Tubulin tyrosine ligase-like protein 5/SRC-1 and TIF2 associated modulatory protein gene) in male mice causes sperm malformation and infertility. *J Biol Chem*. 2013 Apr 4. (Journal Impact Factor = 4.8)

Mercurio, S. June 25, 2008-Sept 2013 Book contract to write & publish *Biological Toxicology* – Jones & Bartlett.

Ruhland CT, Dylsin MJ and **JD Krenz**. (2013) Big Wyoming Sagebrush screens ultraviolet radiation more effectively at higher elevations. *Journal of Arid Climates* 96 19-22.

Peeters R.P., Hernandez A, Ng L, Ma M, **Sharlin D.S.**, Pandey M, Simonds W.F., St Germain D.L., Forrest D. Cerebellar Abnormalities in Mice Lacking Type 3 Deiodinase and Partial Reversal of Phenotype by Deletion of Thyroid Hormone Receptor $\alpha 1$. *Endocrinology*. 2013 Jan;154(1):550-61 (Journal Impact Factor = 4.5).

Bianco A.C. (chair), [Authors Listed Alphabetically] Anderson G., Forrest D., Galton VA, Gereben B., Kim B., Kopp P., Lia XH, Obregon M.J., Peeters R.P., Refetoff S., **Sharlin D.S.**, Simonides W.S., Weiss R.E, Williams G.R. American Thyroid Association Guide to Investigating Thyroid Hormone Economy and Action in Rodent and Cell Models. *Thyroid*. Accepted - In Press (Journal Impact Factor =3 .544).

Wrigley, DM (2012) A curious thing in the medical line, *Microbe* 7(2):115-118

Wrigley, DM (2012) Threats to Ingredient Water Safety, *Food Protection Trends* 32(8):496

Camp, Heather and **Pribyl, Jeffrey**. Learning to Write in Chemistry for Engineers: Sites and Strategies for Fostering Engineers' Communication Skills, paper under review (invited to submit) to *International Journal for Engineering Education*, July 2013.

Lyudmyla Stackpool was a co-author of a new publication (published in January 2013). Ekaterina V. Borisova, Alexey V. Ignatov, Eugeni I. Get`man, Stanislav N. Loboda, Lyudmyla I. Ardanova, Lyudmila V. Pasechnik, Vitaly S. Ponurovsky Sol-Gel Synthesis, X-Ray Diffraction Studies, And Electric Conductivity Of Sodium Europium Silicate, *J. Chem.*, 2013, 251349 (2013).

Losh, S., Rague, R., *submitted* (Feb 2013), Early oxidation in the Biwabik Iron Formation, Minnesota USA, to Mineralium Deposita; in review

Anders, M., Schneider, J., Scholz, C., **Losh, S.**, 2013 The intergranular damage zone: The key to distinguishing faults from slides; *Journal of Structural Geology*, v. 48, pp. 113-125

Bissonnette, D., **Hadley, M.**, He, Y., and Kubow, S. Antioxidant The Effect of Intra- Muscular Injections of Alpha-tocopherol on the Activity of Phospho-Fructokinase in the Slow- and Fast-Twitch Skeletal Muscles of Metabolic Stress-Induced and Malnourished Rats. *Journal of Bioscience*. 2(1): 12-24 (2012)

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Dr. Mahbubur Syed: Co-Editor-in-Chief, Tamkang Journal of Science and Engineering: an International Journal, Taipei, Taiwan. ISN:-1560-6686.

Dr. Guarionex Salivia: Reviewed notes and papers for CHI 2013 and for the Ergonomics Journal.

Dr. Mohamed Diab: “Integrating Risk Assessment in Planning for Sustainable Infrastructure Projects” in the proceeding of International Conference on Sustainable Design, Engineering, and Construction ASCE 2012, Fort Worth, Texas on November 7-9, 2012.

Dr. Brian Wasserman: “Wash Water in the Mix: Testing the Compressive Strength of Concrete” International Journal for Construction Education and Research.

Dr. Nannan He. “Incorporating On-going Verification & Validation Research to a Reliable Real-Time Embedded Systems Course”. Abstract accepted in *Proceedings of the ASEE North Midwest Sectional Conference*, 2013. (full paper under review)

Dr. Nannan He, Dr. Han-Way Huang. “Teaching Real-time Embedded Systems Design on ARM-based Microcontrollers”. Abstract accepted in *Proceedings of the ASEE North Midwest Sectional Conference*, 2013. (full paper under review)

Dr. Nannan He, Dr. Han-Way Huang. “Integrating Modern Model-based Development Concepts and Tools in a Programming Tools Course”. Abstract accepted in *Proceedings of the ASEE North Midwest Sectional Conference*, 2013. (full paper under review)

C. Allendoerfer, D. Wilson, **R. Bates**, J. Crawford, D. Jones, T. Floyd, N. Veilleux, "Strategic pathways for success: From social & extracurricular activity to academic engagement," *Journal of Engineering Education*, July 2012.

D. Wilson, D. Peter, **R. Bates**, J. Crawford, D. Jones, T. Floyd-Smith, N. Veilleux, "Communities that Make a Difference: The STEM Student Perspective," *Frontiers in Education*, Seattle, WA, October 2012.

C. Allendoerfer, **R. Bates**, M.J. Kim, E. Burpee, D. Wilson, "Awareness of and Receptiveness to Active Learning Strategies among STEM Faculty," *Frontiers in Education*, Seattle, WA, October 2012.

T. Floyd-Smith, D. Wilson, D. Jones, M. Plett, N. Veilleux and **R. Bates**, "Understanding Belonging to Improve Persistence: A Gender Study," World Engineering Education Forum, Buenos Aires, Argentina, October 2012.

R. Bates, M. Loui, "Interactive Session: Including Ethical Discussions in your Technical Classes", *Proc. 2013 American Society for Engineering Education Annual Conference & Exposition*, June 2013, Atlanta, GA.

R. Bates, J. Martin, D. Wilson, M. Plett, and T. Floyd Smith, "Interactive Session: Measuring the Impact of Connection to Community", *Proc. 2013 American Society for Engineering Education Annual Conference & Exposition*, June 2013, Atlanta, GA.

D. Wilson, C. Allendoerfer, M.J. Kim, E. Burpee, **R. Bates**, T. Floyd Smith, M. Plett, N. Veilleux, "STEM Students outside the Classroom: The Role of the Institution in Defining Extracurricular Activity," *Proc. 2013 American Society for Engineering Education Annual Conference & Exposition*, June 2013, Atlanta, GA.

Davis D.C., **Ulseth R.R.** "Building Student Capacity for High Performance Teamwork," 120th ASEE Annual Conference, Atlanta, GA, June 2013.

Habibi M., Alaei M. "Integrating professionalism in a project-based engineering curriculum," 120th ASEE Annual Conference, Atlanta, GA, June 2013.

Habibi M., Ulseth R., Carlson M. "Developing design courses in a project-based curriculum," 120th ASEE Annual Conference, Atlanta, GA, June 2013.

Habibi M., Diep E. "Developing an integrated motion capture and video recording for pediatric biomechanical studies," 120th ASEE Annual Conference, Atlanta, GA, June 2013.

Habibi M., Klemer D., Olasz E., "Two-dimensional dielectric imaging for dermatologic screening: a feasibility study. *Skin Res. Technol.* 18 (3), pp 324-331, 2012.

Habibi M., Diep E., "A linear, time-invariant model for cancerous and normal breast tissue.," 33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, San Diego, CA, Sep. 2012.

Dr. Chi Chia Tung "On Noether and strict stability, Hilbert exponent, and relative Nullstellensatz", *Ann. Pol. Math.* 107, No. 1 (2013), 1.

Dr. Chi Chia Tung "On the weak solvability of Schrödinger type equations with boundary conditions", 12. pp., accepted (Aug. 1, 2013) by "Mathematical Reports for the Special Volume dedicated to the Romanian-Finnish Seminar, 2013."

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I.-J. Kim, "Algorithmic Proof of $\text{MaxMult}(T) = p(T)$," *Communications of the Korean Mathematical Society* 27 (2012), 665 – 668.

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Dr. Mezbahur Rahman and **Dr. Han Wu** (2013). "Tests for Normality: a Comparative Study". *Far East Journal of Mathematical Sciences (FJMS)*, 75(1), 143-164.

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Sanjel, D. and Balakrishnan, N. (2012). Jacobi and Laguerre polynomial approximations for distributions of statistics useful in testing for outliers in exponential and gamma samples. *Journal of Statistical Computation and Simulation*. Volume 82, Issue 3, 2012 pages 463-473.

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Dr. H. Wu - (with **Dr. M. Rahman**) (2013). Tests for Normality: A Comparative Study. *Far East Journal of Mathematical Sciences*, Vol.75, No.1, 143-164.

Dr. H. Wu - (with **Dr. Y. Liu**) (2013). A Remixed Bayesian Network Based Algorithm for Flight Delay Estimating. *International Journal of Pure and Applied Mathematics*, Vol.85, No.3, 465-475.

Tsao, Y.L & Pan, T. R. (2013). The computational estimation and instructional perspectives of elementary school teachers. *Journal of Instructional Pedagogies*. Volume 11. Retrieved from: <http://www.aabri.com/manuscripts/121410.pdf>

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Dr. N. Lee - Bioinformatics: An Example of a Cooperative Learning Course, with E. Boyd, MAA Note Series, 2-19, Mathematical Association of America, 2013.

Dr. N. Lee - A Graphical Algorithm for Calculating the Ranks of Complex Reaction Networks, with S. Choo, *J. Appl. Math. & Informatics*, Vol. 30, No. 5, pp. 787 - 792, 2012.

Dr. N. Lee - The Blue Earth River Quality Monitoring Using ARCHER Hyperspectral Data and Field Measurements, with F. Yuan, B. Hoppie, and D. Friend, Vol. 27, pp.1-24, Geocarto, 2012.

Dr. Chi Chia Tung "On Wirtinger derivations of currents and conditions for weak holomorphy and harmonicity", 23 pp. submitted.

I.-J. Kim, B. Barthel, J.L. Dobmeier, S.-C. Kim, Y.-Y. Park, D.-Y. Shin, and J.R. Tait, "Network analysis for active and passive propagation models," To appear in *Networks*.

B. Eastman, **I.-J. Kim**, B.L. Shader, and K.N. Vander Meulen, "Companion Matrix Patterns," submitted to *SIAM Journal on Matrix Analysis and Applications*.

R. Zhao and J. Mohammed-Awel. A mathematical model studying mosquito-stage transmission-blocking vaccines. Submitted to *Mathematical Biosciences and Engineering*.

C. N. Ngonghala, S. Y. Del Valle, **R. Zhao**, and J. Mohammed-Awel. Quantifying the impact of decay in bed-net efficacy on malaria transmission. Submitted to *Journal of Theoretical Biology*.

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Dr. H. Wu - (with **Dr. M. Rahman**) (2013). A Note on Normality Tests Based on Moments. To appear in *Far East Journal of Mathematical Sciences*.

Tsao, Y.L. (2013). Study on the computational estimation performance and computational estimation attitude of pre-service teachers. (submitted)

Dr. N. Lee - Mathematical Approach for Analysis of Biochemical Reaction network, with C.H. Lee, submitted to the *Frontiers in System Biology*.

D.D. Dasenbrock, **Dr. Bryce Hoppie**, B. Field, and D.J. Mattison, Performance Monitoring of a Bridge Abutment Spread Footing From Construction Through Service, Proceedings of the Seventh International Conference on Case Histories in Geotechnical Engineering and Symposium in Honor of Clyde N. Baker, Wheeling (Chicago), IL, April-May 2013.

Budge, A.S., D.D. Dasenbrock and D.J. Mattison, Near-Real-Time Embankment Settlement Monitoring for Construction Control ASCE Geotechnical Special Publication No. 231 - GeoCongress 2013 – Stability and Performance of Slopes and Embankments III (March 2013.)

Mattison, D.J., **A.S. Budge** and D.D. Dasenbrock, Embankment Performance Monitoring for Construction Control and Design Validation , Proceedings of the University of Minnesota's 61st Annual Geotechnical Engineering Conference, Minneapolis, MN, February 2013.

Wilde, W.J., R.P. Dvorak, and B.I. Izevbekhai, Frequency-Domain Temperature Correction of Pavement-Tire Noise, Submitted to the Transportation Research Board for the 93rd Annual Meeting, Jan. 2014.

Wilde, W. J., PCC Surface Characteristics - Rehabilitation MnROAD Study, Minnesota Department of Transportation, Report No. MN/RC-2013-18, Minnesota Department of Transportation, St. Paul, Minn, 2013.

Wilde, W. J., Development of a Concrete Maturity Test Protocol, Minnesota Department of Transportation, Report No. MN/RC-2013-10, Minnesota Department of Transportation, St. Paul, Minn, 2013.

Ejsmont, J.A., G. Ronowski, and **W.J. Wilde**, Rolling Resistance Measurements at the MnROAD Facility, Minnesota Department of Transportation, Report No. MN/RC-2012-07, Minnesota Department of Transportation, St. Paul, Minn, 2012.

Wilde, W. J., Traffic Generating Development and Roadway Life Consumption, Minnesota Local Road Research Board, Report No. 2012RIC11, Minnesota Department of Transportation, St. Paul, Minn, 2012.

Wilde, W. J., Performed laboratory evaluations and treatment studies of soil samples from 57 locations across Minnesota for MnDOT project "Flocculation Treatment Best Management Practices for Construction Water Discharges" using 11 students during year 1 of 2 year project. Prepared 3 project reports.

P. Tebbe, S. Ross, and **J. Pribyl**, "Engaged in Thermodynamics - Student Engagement in the Classroom", 2013 ASEE Annual Conference. (conference paper and poster)

P. Tebbe and J. Dobmeier, "Validation of Transient Bifurcation Structures in Physical Vapor Transport Modeling," 2013 ASME Verification and Validation Symposium.

P. Tebbe, S. Ross, and **J. Pribyl**, "Measuring Student Engagement in Thermodynamics Courses", 2013 Frontiers in Education Conference. (accepted for publication)

Dr. J. Pierce has two books published as E-books: *Elementary Astronomy* and *Notes on Stellar Astrophysics*. They are available from science books on line at <http://www.sciencebooksonline.info/astronomy.html>

Dr. Andy Roberts and his students published a paper "*Student research with 400 keV beams: ¹³N radioisotope production target development*" on Application of Accelerators in Research and Industry, AIP Conference Proceedings.

Dr. P. Eskridge has an article entitled "Science writing that challenges departmental parochialism" published in the online Physics Today in December.

Dr. I. Kogoutiuk is coauthor of a paper published in Materials of the 1st International Conference "Contemporary trends in the mathematics development and their applications", Donetsk, Ukraine 2012, p. 83-85: "The method of irreducible Green functions in the theory of strongly correlated and hybridized electron systems."

R. L. Palma, R. O. Pepin, A. Westphal, D. Schlutter, and Z. Gainsforth, 2013. A Light Noble Gas Inventory of Stardust Cell C2044. 44th *Lunar and Planetary Science*, Abstract #1084, Lunar and Planetary Institute, Houston.

R. L. Palma, R. O. Pepin, D. J. Schlutter, J. Stodolna, A. Westphal, and Z. Gainsforth, 2013. Q-Gases in an Unusual IDP: A Noble Gas Link to Carriers in Stardust Track 41. 44th *Lunar and Planetary Science*, Abstract #1694, Lunar and Planetary Institute, Houston.

Appendix B: Presentations

Winston Sealy presented paper at the Latin American and Caribbean Consortium of Engineering Institutes (LACCEI) in Panama City, Panama.

Sealy, W. (2012), A Finite Element Study of a Patient Lift Conceptual Design, Proceedings of the 10th Latin American and Caribbean Conference for Engineering and Technology – Megaprojects: Building Infrastructure by fostering engineering collaboration, efficient and effective integration and innovative planning, Panama City, Panama, Session R-2C Engineering Design III, July 22-27, 2012.

Winston Sealy conducted a week long workshop (with MNCEME) for Henderson Middle school teachers on how to teach Minnesota's engineering and science standards incorporating ipad technology.

Winston Sealy presented at a ten-day Engineering Camp for teachers intended to build expertise in teaching engineering standards to students in grades 6, 7, and 8. Teachers will take away integrated curriculum, activities and hands-on-projects for classroom use.

Wandrie, L.J. (graduate student), **J.D. Krenz, B.J. Cook** and P. Nagel. April 2012. Influences of adjacent land-use on avian community structure in sub-boreal peatlands of the Midwest. Ninth Annual Northern Plains Biological Symposium. North Dakota State University, Fargo, ND.

Hart. M. and **Goellner G.M.**, Splicing Together Funding Sources To Maintain an Active Undergraduate Research Program During Times of Financial Constraint. National Conference on Undergraduate Research (NCUR), (2012). Weber State University.

Lee. H. and **Goellner G.M.**, Characterization of the Novel Polyglutamine Protein FAM171B. National Conference on Undergraduate Research (NCUR), (2012). Weber State University.

Perlik, M.K., B.R. McMillan, & **J.D. Krenz**. 2012. Food habits of the hoary bat in an agricultural landscape. Minn. Acad. Sci. J. 75:1-6.

Proctor, B. *AWRA 2013 Spring Specialty Conference on Agricultural Hydrology and Water Quality II*, March 25-27 in St. Louis, MO,

Proctor, B. The Use of USGS MODFLOW and Solute Transport Engines as a Tool in Site Assessment, Jason Nolan and Dr. Beth Proctor,

Proctor, B. *National Water Quality Monitoring Council conference in Portland, Oregon, Spring 2012*, The Development of a Reference Lake Screening Tool for Natural Lakes in the Prairie Pothole Region of the United States Using 2007 NLA Land Use and Water Chemistry Data, Joe Hoffman and **Dr. Beth Proctor**.

Sharlin, D. Invited Seminar - *Thyroid Hormone Transporters in Neurodevelopment* at the 82nd Annual Meeting of the American Thyroid Association in Quebec City, Quebec Canada on September 20, 2012.

Sharlin D. Invited Panelist - *Finding your First Academic Position*, 82nd Annual Meeting of the American Thyroid Association in Quebec City, Quebec Canada on September 21, 2012

August 2013. **Ruhand CT** and AH Warnke.* The effects of salinity, irrigation and harvest regime on stem water potentials and leaf chlorophyll fluorescence parameters in *Medicago sativa* L.. 98th Meeting of the Ecological Society.

August 2013. Warnke* AH and **CT Ruhland**. The effects of harvest regime, irrigation and salinity on stem lignocellulosic concentrations in alfalfa (*Medicago sativa* L.). 98th Meeting of the Ecological Society of America.

Twayana, JL++ and **DM Wrigley** 2012. The earthworm, *Eisenia fetida*, regenerated nephridia lack the nephridial symbiont.

Ziegler, B. and L. Montplaisir. 2012. Examining integrative thinking through the transformation of students' written reflections into concept webs. *Advances in Physiology Education*.

Zojonc, S. & Lavoie, B. (2012, April). *Birth control methods: Cases for teaching the facts and real-life decision making*. Presentation at the National Science Teachers' Association 2012 National Conference on Science Education, Indianapolis, IN.

Foord, Kathleen; Bemel, Laura; Burns, Carol; O'Brien, Lynn; **Pribyl, Jeffrey**, Inter- Institutional Learning Teams for Teacher Effectiveness, Presentation at Learning Forward 2013 Summer Conference, Minneapolis, MN July 2013.

Heather Camp and **Jeffrey Pribyl**, February 2013, Composing in Chemistry: Initiating and Sustaining a Multi-Disciplinary Collaboration, Workshop presented at Center for Excellence in Scholarship and Research, Minnesota State University, Mankato, Mankato, MN.

Two undergraduate students Hilary Deragisch (chemistry major) and Nicole Stenzel (biochemistry major) presented a poster "Substitution of Calcium by Lanthanum(III) in Synthetic Calcium Vanadate Apatite" at the MSU Undergraduate Symposium, April 16th 2013. The students were honored by "Outstanding Presentation Award."

Megan Claflin and **John Thoemke**: National Meeting of the American Chemical Society, New Orleans, April 2013, *Phototransformation of the herbicide acetochlor: Effects of surface water composition*, poster presentation, Sci-Mix and Division of Environmental Chemistry
Spectroscopic and photochemical studies of sunscreen active ingredients: An undergraduate physical chemistry experiment, poster presentation, Division of Chemical Education.

Kurtis Malecha and **John Thoemke**: National Meeting of the American Chemical Society, New Orleans, April 2013, *Photoproduced reactive species in natural waters: Influence of chromophoric dissolved organic matter properties*, poster presentation, Sci-Mix and Division of Environmental Chemistry.

Jedida Ouedraogo and **John Thoemke**: National Meeting of the American Chemical Society, New

Orleans, April 2013, *Photoproduction of singlet oxygen in natural waters: Influence of Cu²⁺ and Fe³⁺ complexed by dissolved organic matter*, poster presentation, Division of Chemical Education.

Danielle Hron and **John Thoenke**: Great Lakes Regional Meeting of the American Chemical Society, La Crosse, WI, June 2013, *Reactions of Singlet Oxygen with Free Amino Acids*, poster presentation

Losh, S., Rague, R., 2013, Silica Remobilization in the Biwabik Iron Formation, Minnesota USA; Proc. and Abstr., Institute on Lake Superior Geology, 59th Ann. Mtg, Houghton MI, Part I.

Losh, S., Rague, R., 2012, Economic implications of silica remobilization in oxidized Biwabik Iron Formation, Minnesota; Geol. Soc. Amer. Annual Mtg. Abstr. w. Prog, v. 44

Danaè R Quirk Dorr and **M. Hadley**. (2012) Boosting laboratory preparedness and experimental comprehension: Integration of online pre-laboratory modules. *Oral Presentation*. 244th American Chemical Society National Meeting, Philadelphia, PA.

Danaè R Quirk Dorr and **M. Hadley**. (2012) Assessing the impact of roles as they relate to student learning styles in the POGIL laboratory. *Oral Presentation*. 244th American Chemical Society National Meeting, Philadelphia, PA.

Danaè R Quirk Dorr and **M. Hadley**. (2012) Linking metacognitive knowledge and learning styles through team-based learning in the laboratory. *Oral Presentation*. 22nd Biennial Conference on Chemical Education, State College, PA.

Danaè R Quirk Dorr and **M. Hadley**. (2012) Less lecture, more learning: Students learning from each other. *Oral Presentation*. Showcase of Student Success, Mankato, MN.

M. Hadley, S. Sifers, and R. Auger. (2013). Through the Eyes of the IRB. Professional Development Day, Minnesota State University MN

M. Hadley, (2013) Team Based Learning. CETL, Minnesota State University Mankato.

Seven students (Megan Clafin, Laura Groskreutz, Kurtis Malecha, Megan Maloney, Jedida Ouedraogo, Clayton Wagner, Paul Yanez) presented their undergraduate research conducted in the **Department of Chemistry and Geology** at the National Meeting of the American Chemical Society (New Orleans, April 2013)

Seven students (Briana Frolov, Alec Ganske, Clay Miller, Sonika Sainju, Lina Wang, Eva Serem, and Ryan Rague) presented their undergraduate research projects at NCUR 2103. These students were mentored by **Biochemistry and Geology faculty** within the Department of Chemistry and Geology. The six projects conducted by these seven students represented over 20% of the presentations by MSU Mankato at NCUR.

Twenty-two students (Hilary Deragisch, Nicole Stenzel, Ryan Bonney, Ryan Rague, Neil Ranals, Sonika Sainju, Briana Frolov, Kurtis Malecha, Farjana Siddika, Andria Sellner, Danielle Hron, Alec Ganske, Clayton Miller, Sharmin Hossain, Jenna Bowman, Brittany Leeder, Clayton Wagner, Paul Yanez, Megan Maloney, Selam Mebrata, Paurakh Subedi, Keenan Rustad) presented their undergraduate research projects at the Undergraduate Research Symposium April 16, 2013. These

students were mentored by **faculty** within the **Department of Chemistry and Geology**.

Hoppie, B., and Witt, A., 2013. Early Diagenetic Alteration of Zeolites in Subseafloor Sediment of the South Pacific Gyre (Gold2013:abs:1806)

Geological Society of America: Mahoney, J.B., Pignotta, G., Ihinger, P.D., **Wittkop, C.**, Taylor, S., Leistikow, A., Advanced undergraduate geologic mapping: the use of collaborative EDMAP projects at the University of Wisconsin-Eau Claire. GSA Abstracts with Programs v. 45, n. 7, p. TBD

P. Tebbe, S. Ross, and **J. Pribyl**, "Engaged in Thermodynamics - Student Engagement in the Classroom", 2013 ASEE Annual Conference. (poster)

P. Tebbe, S. Ross, and **J. Pribyl**, "Full Development of Engineering Scenarios to Promote Student Engagement in Thermodynamics Related Courses," Transforming Undergraduate Education in STEM: Building a Community to Transform Undergraduate STEM Education, January 2013. (poster)

Dr. Mahbubur Syed: Invited speaker: *Cloud computing: Technology, Security and Trust*. (invited). International Conference on Informatics, Electronics & Vision (ICIEV 12). 18-19 May, 2012, Dhaka, Bangladesh.

Mahbubur Syed: *Cloud Computing: Transforming Education and Educators*. The Association of Teacher Educators (ATE) 2012 Summer Conference, 3-7 August, 2012, Boston, MA.

Guarionex Salivia: Submitted two papers to CHI 2013, (acceptance rate 20%) one was accepted and presented it at CHI 2013 in Paris, France.

Matt Durand: Presentation - *Healing After the Flood – Owatonna Stream Bank Restoration*. Presented at Minnesota Water Resources Conference October 2012, St. Paul, MN.

ZAP Camp participation from faculty members (**Budge, Priem, Winstead, Allen**) teaching middle school students about robotics.

Participation of faculty in STEM camp for middle school students by **Aaron Budge** and **Vince Winstead** and **Ashley Priem**.

R. Bates, The Iron Range Engineering Model: Project-based learning for Technical, Professional & Design Competencies, Engineering the Future NSF PEEC Workshop, August 2, 2012.

R. Bates, "Twin Cities Engineering," MnSCU Metro-area community college deans, October 9, 2012.

R. Bates, "Engineering Education: What if engineering educators were education engineers?" CSET Catalyzing Conversations, November 13, 2013.

R. Bates, "Twin Cities Engineering," Normandale Community College Success Day, February 12, 2013.

R. Bates & R. Ulseth, “Assessing Project-based Learning: Providing Evidence for Continuous Improvement,” Keynote address for the Rose-Hulman Evaluation Conference, April 1, 2013.

M. Habibi, “The Best Way to Learn,” IEEE Arrowhead section meeting, IRE, April 2013 .

R. Bates, Engineering Education Research Leaders NetWorkshops: Mentoring, Communicating and Power Brokering for the Next Generation, satellite to the ASEE Annual Conference, June 22-23, 2013.

D. Kelley, “Workshop for Teachers: Computer Science Experiences,” May 20-24, 2013.

In-Jae Kim June 3 – 6, 2013: 2013 International Linear Algebra Society (ILAS) Meeting in Providence, RI; “Creating a User-Satisfaction Index”

In-Jae Kim April 26 – 27, 2013: American Mathematical Society (AMS)-Central Section Meeting at Iowa State University, Ames, IA; “Eventual Positivity in Multivariate Data Analysis”

In-Jae Kim October 16, 2012: International Academy of Business and Economics (IABE) Conference in Las Vegas, NV; “On the development of a satisfaction survey instrument using PageRank centrality”

R. Zhao - What makes eradication of malaria difficult? MAA North Central Section Meeting, University of Minnesota, Duluth, October 19-20, 2012.

R. Zhao - A new mathematical model studying Mosquito-stage transmission-blocking vaccine. Department Colloquium. Minnesota State University, Mankato. March 27, 2

D. Singer - Spring 2013 meeting of the North Central Section of the Mathematical Association of America, Gustavus Adolphus College, Saint Peter, Minnesota.

Herbert C. Heien and **Mezbahur Rahman**, Revisiting the Digits of π and Their Randomness, Minnesota State University, Mankato, March 14, 2012.

Mezbahur Rahman and **Han Wu**, Comparing Normality Tests, International Conference hosted by Bangladesh Statistical Association, Dhaka, December 27, 2012.

H. Wu - (with **M. Rahman**) (2013). Tests for Normality: A Comparative Study. Far East Journal of Mathematical Sciences, Vol.75, No.1, 143-164.

H. Wu - (with Y. Liu) (2013). A Remixed Bayesian Network Based Algorithm for Flight Delay Estimating. International Journal of Pure and Applied Mathematics, Vol.85, No.3, 465-475.

Tsao, Y.L. (2013). The computational estimation and computational estimation attitude of pre-service elementary teachers. In Proceedings 2013 of Clute Institute International Academic Conference- Breckenridge. p116-123, CO, August 5-7, 2013.

Tsao, Y.L. & Pan, T.R. (2013). Computational Estimation of Elementary School Teachers. Academic and Business Research Institute International Conference - Orlando, FL, January 3 - 5, 2013.

Dahlman A. , Chapman, C. , Burnett, R. , Preimesberger, P., **Tsao Y.L.** & Wallace, T. (2012) . Preparing Effective Innovative, Collaborative and Relevant Teachers through the AVID Teacher Preparation Initiative. Minnesota Association of College for Teacher Education Congress. Minneapolis, MN, November 8, 2012.

Tsao, Y.L. & Lee, N . (2012). Number sense of pre-service teacher. In Proceedings of the 12th International Congress on Mathematics Education . p.7675, Seoul, Korea.

F. Hannick - Harrisburg, Pennsylvania PCTM, October 18, 2012, Hands-On Experience with Numerous Activities for the Elementary Math Curriculum (3-5)

N. Lee - From Omics Data to Knowledge, Case 1: Microarrays, with M. Macauley, S. Mondal, and F. Tang, University of Tennessee, Knoxville, TN, January 7-10, 2013.

N. Lee - Bioinformatics and Potential Curricular Possibilities Open Forum, MAA-NCS NExT, Duluth, MN, October 19-20, 2012.

N. Lee - Bottom-up approach to Mathematical Modeling in Ecology and Epidemiology, Math-Fest, Madison, WI, August 2-4, 2012.

Budge, A.S., Driven Pile Design Process and Negative Skin Friction, Two Invited Presentations at Professor's Driven Piling Institute (PDPI) hosted by the Pile Driving Contractors Association, Logan, UT, June 2013.

Budge, A.S., State of Practice in Minnesota Department of Transportation (MnDOT) Pile Driving, Presentation at Deep Foundations Institute (DFI) SuperPile 2013 – Piling Design and Construction Conference, Minneapolis, MN, May 2013.

Dasenbrock, D.D. and **A.S. Budge**, GEMINI: Concept for Promoting Knowledge Availability of Geotechnical Asset Characteristics and Performance, Transportation Research Board (TRB) 2013 Session 364, Presentation P13-5259, Washington, D.C., January 2013.

Presented poster: "Characterization of Concrete Sediments from Construction Operations for the Protection of Storm and Surface Waters" by **S. Druschel, L. Roue & B. Wasserman**, Minnesota State University, Mankato at Minnesota Water Resources Conference, St. Paul, October 2012.

Engineering professor **Steve Druschel** of Minnesota State-Mankato University headed the study to determine the most effective de-icer for the money and the findings are familiar. Presentation "Effectiveness of Deicers and Anti-icers" at the 12th Annual Road Salt Symposium, Minnesota Landscape Arboretum, Chaska, MN, February 2012. Interviewed by WCCO 830 AM (<http://minnesota.cbslocal.com/2013/02/07/rock-salt-still-the-best-de-icer/>).

Dr. Steve Druschel, presentation "Statewide Evaluation of Soils for Improving Construction Site Discharge Through Site-Specific Chemical Treatment" at 24th Annual Transportation Research

Conference, St. Paul, Minnesota, May 2013.

P. Tebbe, S. Ross, and **J. Pribyl**, "Full Development of Engineering Scenarios to Promote Student Engagement in Thermodynamics Related Courses," Transforming Undergraduate Education in STEM: Building a Community to Transform Undergraduate STEM Education, January 2013.

An astronomy student, Abolaji Akinyemi, and **Dr. Andy Roberts'** student research group (Lucas Swanson, Jessica Stensland, Udit Kapur, Nathan Gretz, and James Faraday) each presented a paper at the MnSCU Undergraduate Research Conference on April 8 2013.

Dr. Andy Roberts' group of undergraduate students presented their research at the MSU Undergraduate Research Conference, and the National Conference for Undergraduate Research in La Crosse, WI.

Dr. I. Kogoutiuk attended two international conferences in the Ukraine, and made a presentation at one of them.

"A Light Noble Gas Inventory of Stardust Cell C2044" 44th *Lunar and Planetary Science Conference*, **R. L. Palma**, R. O. Pepin, A. Westphal, D. Schlutter, and Z. Gainsforth, Houston, TX, March 18-22, 2013.

"Q-Gases in an Unusual IDP: A Noble Gas Link to Carriers in Stardust Track 41" 44th *Lunar and Planetary Science Conference*, R. L. Palma, R. O. Pepin, D. J. Schlutter, J. Stodolna, A. Westphal, and Z. Gainsforth, Houston, TX, March 18-22, 2013.

Appendix C: Grants

Goellner G. MSU-Mankato URC: “Intracellular Localization of the Novel Polyglutamine Protein FAM171B- Searching for Localization Using a Recently Available Antibody.” 2012-2013. \$500.

Goellner G. MSU-Mankato URC: “Intracellular Localization of Novel Polyglutamine Protein FAM171B.” 2012-2013. \$500.

Goellner G. MSU-Mankato Biology Department (Graduate): “Determining the Expression and Localization of the Putative Protein FAM157A in HEK and HELA Cells” 2011-2012. \$1000.

Goellner G. MSU-Mankato Biology Department: “Intracellular Localization of the Novel Polyglutamine Protein FAM157A” 2011-2012. \$500.

Goellner G. MSU-Mankato URC: “Mitochondria as a Potential Localization site for the Novel Protein KIAA1946” 2011-2012. \$500.

2012-2113 *Effect of reduced nitric oxide on kidney sodium handling in female rats.* Undergraduate Research Grant – Foundation Grant. Kaleb Short. (Mentor: **P. Knoblich**)

Krenz, J. 2012. MSU Faculty Research Grant (\$5,000; 1 yr), *Principal Investigator*: Variance in reproductive success among male Galapagos lizards (*Microlophus bivittatus*).

Mercurio, S. Changing Cellular Architecture of Gastrointestinal Tract in Male Mice by a High Fat Diet. 2012-1013

Ruhland, CT. 2013 to Present. Principal Investigator. Minnesota State University. “Photodegradation in deserts: litter optical and structural considerations.” NSF grant, Division of Environmental Biology. (w/ TA Day, F Garcia-Pichel).

2013 Collaborative Research: Photodegradation in deserts: litter optical and structural considerations. National Science Foundation, Office of Ecosystem Science. Principal Investigators: Drs. Thomas A. Day, Ferran Garcia-Pichel and **C.T. Ruhland**. \$1,320,061

Sharlin D. URC supply grant \$500 (Piroso/Haack; Fall 2012). Honors Program Research Grant \$500 (Zawed; Summer 2013).

Toma, D. Principle Investigator, Faculty Research Grant, Minnesota State University, Mankato. Finding genes involved in hygienic behavior in the honey bee, *Apis mellifera*, S4,998.34 March 2011- June, 2013

Toma, D. Principle Investigator, Private Grant: Dr. Patrick Guinan through Hektoen Institute Project: Book regarding medieval and ancient paradigms of biological and scientific thought. Total: \$12,662. Sabbatical work 2013-2014.

Ziegler, B. *Analyzing Pre-Service Elementary Teacher's Beliefs Toward Biology*. Minnesota State University Mankato Faculty Research Grant, (one year \$919.46), 2012

Dr. Steven Losh: Software Grants from IHS Kingdom (2D PAK, 3D PAK seismic interpretation) for teaching GEOL 430 Petroleum and Ore Deposits Geology, and from Platte River Associates (BasinMOD basin modeling) also for teaching GEOL 430. Software grant from Maptek for Vulcan mine modeling software. All included ten student seats; software is installed in FH 139 and on my office computer. Total value not known, but Vulcan license is typically \$15K and BasinMOD is around \$12K. The Kingdom software is at least that much.

Dr. Wittkop not selected for funding-Collaborative Research: RUI: Evaluating late Pleistocene-early Holocene temperature and precipitation change in the Rocky Mountains by integrating geomorphic and lacustrine records.

Dr. Allan Hart: two grants from MnDOT. The first grant in the amount of \$15000 was for the development of a prototype mobile device application that would allow MnDOT engineers to obtain data about a particular bore hole. The second in the amount of \$35000 is for continued development of the app and the porting of it from an Android app to an IOS app.

Dr. Qun Zhang received 2013 Douglas Moore Lectureship Award and a \$10,000 grant from Micropoint Bioscience Inc.

Dr. Vincent Winstead was awarded an FIG to attend the HAWTech summer school in Germany

Dr. Nannan He was awarded a RASP Faculty Research Grant (\$5000) on the "Model-based Verification and Validation of Real Time Embedded Software"

NSF S-STEM Scholarship Award, MAX Scholarships: Interdisciplinary Mentored Academic EXperience for STEM Success, 2011-2015 **Rebecca Bates** (PI) Co-PIs: **Marilyn Hart, Deborah Nykanen, Brian Martensen**, \$600,000

NSF REESE Award, Connection, Community, and Engagement in STEM Education (Large Empirical, Contextual Research Topics in STEM Education), 2009-2014 **Rebecca Bates** (PI) Collaborators: University of Washington, Tuskegee University, Simmons College, Seattle Pacific University, \$255,000

NSF Computing Infrastructure Award, The Speech Recognition Virtual Kitchen, 2013-2016, **Rebecca Bates** (PI) Collaborators: Carnegie Mellon University, Ohio State University, \$145,354

NSF Engineering Education Workshop Award, Engineering Education Research Leaders NetWorkshops: Mentoring, Communicating and Power Brokering for the Next Generation, 2013-2014, **Rebecca Bates** (PI) Collaborator: Clemson University, \$3990 (\$50,000 total)

Dr. Aaron Budge was awarded grant "Salt Brine Blending to Optimize Deicing and Anti-Icing Performance and Cost Effectiveness: Phase II" from MnDOT for \$116,114 over 16 months.

Dr. Steve Druschel was awarded grant for "Flood Mitigation Study of the Zumbro River Watershed,

Minnesota" for \$50,000 from the Minnesota Legislature through the MnDNR. Performed work using 14 students. Presented results and received input using 5 to 6 students per meeting during public forums in Pine Island (October, 2012), Hammond (August, 2012), and Rochester (August, 2012). Subject of two articles in Rochester Post Bulletin, August 14 and August 23, 2013.

The **Department of Mechanical and Civil Engineering** spearheaded a successful MSU Strategic Priority proposal, in partnership with the other engineering and engineering technology departments, for the Development of a Minor/Certificate in International Engineering and Technology.

The **Department of Mechanical and Civil Engineering** received a grant from MNCEME for a project titled, "Building Engineering Connections During the Sophomore Year." One aspect of the project will involve creating more opportunities for sophomore engineering students to interact with and learn from industry representatives.

The **Mechanical Engineering** program was accepted as an implementation site for the NSF sponsored ENGAGE program "Engaging Students: Everyday Examples in Engineering (E³s)". Dr. Sungwon Kim received a mini-grant as part of this to incorporate new student activities into the freshman ME101 course to improve student retention.

Dr. Andy Roberts' team of undergraduate students received \$2,000 grant from the Foundation for their research proposal.

Dr. R. Palma's research group at the University of Minnesota has received \$235K from NASA for their research.

Appendix D: Contracts

Dr. Bruce Jones and **Gary Mead** secured grants and contracts thru the MnCAR lab for \$346870. Companies and organizations they are with are Arctic Cat, Bogue Inc. mini Truck and the Minnesota Corn Growers Association.

Dr. P. Knoblich wrote and received funding from “reinvestment funds” to upgrade the data collection hardware for the physiology labs. New hardware was purchased on an “exchange program” which involved sending in the old units and getting new ones. In late summer/fall of 2012, she loaded the software and revised the laboratory templates to match the new software and hardware.

Dr. Jeffrey R. Pribyl, provided year long professional development activities for Hilltop Elementary School in Henderson, MN. This is a STEM school for all 4th and 5th grade students in the district. Provided information on both guided inquiry methods and content related to the 5th grade science standards. These sessions were held about once a month for the school year. Sessions lasted in length from two to four hours.

Dr. Michael Wells and FPX signed a two-year extension to their contract with MSU worth an estimated value of \$384,939.

Dr. Michael Wells and Maverick Software Consulting signed a five-year contract with MSU worth an estimated \$2,165,829. MnDOT Resource Centers: \$585,000

Dr. Brian Wasserman was awarded MnDOT Enterprise Project Management: \$220,000

Legislative financial support allowed for a new building to be built housing the Iron Range Engineering program on the campus of the Mesabi Range Community and Technical College, **Rebecca Bates**.

R.Zhao - Faculty Research Enhancement Grant for a course reduction, College of Science, Engineering and Technologies, Minnesota State University, Mankato, Spring 2014

R.Zhao - Funded for a Short-Term Visit to National Institute for Mathematical and Biological Synthesis (NIMBioS) in Knoxville, 2013

R.Zhao - President's Teaching Scholar Fellowship, Minnesota State University, Summer 2013

Y. Tsao - Award of the Faculty Research Enhancement Grant from College of Science, Engineering and Technology, Minnesota State University-Mankato to conduct research projects for the Fall 2012, Fall 2013 and Fall 2014.

S. Druschel received a contract extension for Years 4 and 5 of research project "Streamflow measurement of County Ditch 57, Mapleton, Minnesota" from Blue Earth County through I&S Group. Began involvement of MSU **Geology Program**. Performed field evaluations and collected data during Year 2 of 5 using 4 students.

The **Water Resource Center** completed several major projects:

- The MN River Monitoring Project (\$ 403,000)
- The CMM Communication Marketing Plan (\$25,000)
- The Waseca Lakes Project (\$63,710)
- 7 Mile Creek (\$34,345.84)
- Duck Lake Vegetative Survey Project (\$17,949.60)
- The Evaluation of Artificial Drainage in Altering Hydrology (\$300,000)
- The on-going MRB contract (\$204,455)

The **Water Resource Center** started of several newly funded projects

- The MN River Blueway System (\$5,000)
- Flood Mitigation Study – Zumbro River (partnering with Professor Druschel) (\$50,000)
- SW MN Civic Engagement Cohort (\$18,312.66)
- The MRB 319-NTT Project (\$47,399),
- Sediment Fingerprinting in the GBE Basin (\$4,000)
- The Lac qui Parle-Yellow Bank Terrain Analysis (\$66,572)
- Watershed Monitoring Network (\$260,324)
- Le Sueur Civic Engagement (\$137,787.27)
- SWAG monitoring contract through MPCA (\$80,546.43)
- Another project, Le Sueur Watershed Targeted Conservation Practices is in process through the MPCA (\$82,491)

Appendix E: Implementation Actions - WORKING DRAFT as of 23 JANUARY 2013

Application of Document

1. To fully acknowledge the importance and significance of this document the committee requests that the document become a decision-making tool that will influence budgetary and staffing decisions
2. The document is intended to be a living strategy, therefore decision must be weighed within the context of mission and vision
3. Sustainable student and faculty success is the key outcome of this document, a direction for the future, revitalization of a college, therefore decisions must and should be prioritized based on strategic initiatives
4. The document serves as a credible source of discussion and direction because it has been vetted throughout the college
5. The document represents faculty and student dedication and commitment to the well-being and growth of the college.

In order for this to work, the ADMINISTRATION of CSET and of MSU must be willing to embrace this vision, and it must infuse their decision-making and prioritization processes. The “reward” system for faculty and staff must be tied to the employee’s contribution to the success of this strategic plan; this includes Art 22 / T & P/ etc.

Need to reaffirm faculty’s “responsibility” to show how their Art 22 activities mesh w/ strategic plan, and how their activities complement the department/CSET missions.

This view must extend to the administration’s assessment of departments / programs / centers, etc.

The first table contains the Goals (grey-shaded heading sections) and the corresponding strategic initiatives and action steps that were identified through the work of the strategic planning group during spring 2012. The numbers in brackets provide the link to the second table, which lists the action steps (in some cases paraphrased and consolidated) and additional steps identified by the implementation group. These steps are classified within “global action” groupings and then divided according to which CSET entity(ies) would bear primary responsibility for initiating and fulfilling the action steps.

Appendix E: Implementation Actions - WORKING DRAFT as of 23 JANUARY 2013

Table 1

SOLUTIONS	
<i>promote quantitative, technological and analytical solutions, that focus on regional issues with global connections</i>	
<i>Strategic Initiatives</i>	<i>Action Steps</i>
<ul style="list-style-type: none"> Promote quantitative literacy and reasoning across the curriculum including outside the College of Science, Engineering and Technology (CSET) and in general education 	[1.1] Advocate for the need for science, technology, engineering, and mathematics into the general education curriculum through involvement with the general education committee
<ul style="list-style-type: none"> Prepare Science and Math teachers and increase the science, technology, engineering, and mathematics (STEM) pipeline, with special emphasis on under-represented populations, for Minnesota and beyond 	[1.2] Create a recruitment plan addressing under-represented groups [1.3] Talk more about the integration of science, technology, engineering and math [1.4] Promote the need for STEM majors and build student numbers
<ul style="list-style-type: none"> Connect students, faculty, and research centers with industry, alumni, and external agencies 	[1.5] Make connections with industry, alumni and external agencies [1.6] Devote resources to faculty research programs [1.7] Designate start-up funds for release time, faculty lines/position, equipment and space
<ul style="list-style-type: none"> Develop versatile student skills and knowledge for professional careers and advanced study in a rapidly changing world 	[1.8] Increase student awareness of what you can do with a science, technology, engineering or mathematics major

Appendix E: Implementation Actions - WORKING DRAFT as of 23 JANUARY 2013

TEACHING & LEARNING <i>promote advanced, engaging teaching methods, classrooms and laboratories guided by effective assessment of student learning</i>	
Strategic Initiatives	Action Steps
<ul style="list-style-type: none"> • Create classrooms and laboratories that promote collaboration and active learning 	[2.1] Establish an in-house exchange of active learning tools that promote success
<ul style="list-style-type: none"> • Maintain technologically advanced laboratory and classroom equipment 	[2.2] Analyze existing technical support staff function and role [2.3] Increase funds and grants for new equipment [2.4] Focus on maintenance of existing equipment
<ul style="list-style-type: none"> • Develop new, stimulating teaching methods 	[2.5] Sponsor site visits to aspirant programs [2.6] Hold intra-college teaching workshops to develop pedagogy
<ul style="list-style-type: none"> • Support curriculum development and research on pedagogy 	[2.7] Provide release time for curriculum and pedagogy development [2.8] Invite visiting experts to conduct presentations
<ul style="list-style-type: none"> • Achieve measurable success in student learning 	[2.9] Hold Intra-college assessment discussions to share information
Exploration <i>enhance existing programs and develop new directions</i>	
Strategic Initiatives	Action Steps
<ul style="list-style-type: none"> • Promote cross-disciplinary courses, degrees, and programs 	[3.1] Evaluate course duplication across campus and advocate our expertise
<ul style="list-style-type: none"> • Facilitate collaboration among colleagues within the college and beyond 	[3.2] Disseminate CSET research via colloquia, brown bags, etc. [3.3] Work with modeling and simulation center
<ul style="list-style-type: none"> • Connect College of Science, Engineering and Technology Centers of Research with multiple disciplines and industry 	[3.4] Market services and programs

Appendix E: Implementation Actions - WORKING DRAFT as of 23 JANUARY 2013

<ul style="list-style-type: none"> • Become known as the science, technology, engineering, and mathematics Master's degree provider of choice for Minnesota 	<p>[3.5] Track and assess what is happening to our graduates and programs</p> <p>[3.6] Market programs</p>
<ul style="list-style-type: none"> • Explore opportunities for new Master's and doctoral programs 	<p>[3.7] Develop applied master's programs such as the Professional Science Master's</p> <p>[3.8] Conduct feasibility and market analysis –where is our master's niche?</p>
<p>Mentorship <i>provide a mentored educational experience to every student in the college</i></p>	
<p>Strategic Initiatives</p>	<p>Action Steps</p>
<ul style="list-style-type: none"> • Promote environments for faculty-student interactions 	<p>[4.1] acknowledge and nurture existing departmental-student interactions, identify and fill gaps</p> <p>[4.2] Secure stable funding for students to attend competitions and conferences</p> <p>[4.3] Promote informal opportunities for student/faculty interactions</p> <p>[4.4] Capitalize on existing spaces to create STEM communities in which students can study/converse among themselves and/or faculty</p>
<ul style="list-style-type: none"> • Facilitate student opportunities in student research, service learning, and internships 	<p>[4.5] Clarify and promote the benefit to students of involving themselves in URC research</p>
<ul style="list-style-type: none"> • Foster individualized student academic guidance 	<p>[4.6] Assign reasonable number of advisees to faculty members; recognize those who are good advisors</p> <p>[4.7] Honor office hours and provide accessibility plan</p> <p>[4.8] Increase student awareness of tutoring / career development / professional school preparation type resources and software</p>
<ul style="list-style-type: none"> • Encourage small class sizes to foster collaborative learning environments 	<p>[4.9] Advocate strongly for maintaining a quality learning environment</p> <p>[4.10] Encourage greater use of project-based and inquiry-based learning methods in appropriate courses/disciplines</p>

Appendix E: Implementation Actions - WORKING DRAFT as of 23 JANUARY 2013

<ul style="list-style-type: none"> Increase student scholarships and grants and encourage students to apply for these opportunities 	[4.11] Make essay part of writing intensive course [4.12] Develop greater focus on scholarship opportunities [4.13] Introduce potential donors to faculty and students

TABLE 2: (see bottom of page 1 for explanation)

GA1: Re-assigned Time			
<i>Dean's Office</i>	<i>Department</i>	<i>Individual Faculty or Staff</i>	
[1.2] develop recruitment plan [1.6,7] support of faculty research / mentorship [2.7] curriculum and pedagogy development			
GA2: Prioritization for Resource Allocation / Administrative Choices			
<i>a] Dean's Office</i>	<i>b] Department</i>	<i>c] Individual Faculty or Staff</i>	
[1.2] new STEM specific admissions position [1.6,7] Faculty research support; overhead a resource; CSET – specific RASP partial position	[2.1] Examine classroom scheduling and impact of dedicated classrooms designed to improve active learning [4.9] Advocate strongly for		

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<p>[2.1] Classroom / lab improvements receive priority for R & R funds</p> <p>[2.1] Resources given to dept to explore discipline-specific “best practices” for R & R</p> <p>[2.5] Site visits for dept reps to aspirant programs</p> <p>[4.2] Secure stable funding for students to attend competitions and conferences</p> <p>[4.4] Capitalize on existing spaces to create STEM communities in which students can study/converse among themselves and/or faculty</p> <p>[4.9] Advocate strongly for maintaining a quality learning environment</p>	<p>maintaining a quality learning environment</p>		
GA3: Reporting / Assessment			
a) Dean’s Office	b) Department	c) Individual Faculty or Staff	
GA4: Publicity / Marketing			
a) Dean’s Office	b) Department	c) Individual Faculty or Staff	
<p>[1.4] Promote STEM majors, build student numbers</p> <p>[1.8] increase awareness of utility of STEM majors</p> <p>[3.2] promote Catalyzing Conversations more broadly.</p> <p>[3.4] .improve recruitment of potential STEM K12 teachers</p>	<p>[3.4] raise admission standards, attract more well-prepared students</p> <p>[3.4] become school of choice for continuing ed opportunities for teachers</p> <p>[3.6] market programs</p> <p>[3.8] feasibility and marketing</p>		

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<p>[3.4] become school of choice for continuing ed opportunities for teachers</p> <p>[3.6] market programs</p> <p>[3.8] feasibility and marketing analysis to identify niche for grad programs</p>	<p>analysis to identify niche for grad programs</p>		
<p>GA5: Advising / Mentoring / “profession courses”</p>			
<p>a) Dean’s Office</p>	<p>b) Department</p>	<p>c) Individual Faculty or Staff</p>	
<p>[3.4] provide more effective support for un/ill prepared students</p> <p>[4.8] Increase student awareness of tutoring / career development / professional school preparation type resources and software</p>	<p>[1.8] increase awareness of utility of STEM majors</p> <p>[3.4] provide more effective support for un/ill prepared students</p> <p>[4.1] acknowledge and nurture existing departmental-student interactions, identify and fill gaps</p> <p>[4.3] Promote informal opportunities for student/faculty interactions</p> <p>[4.5] Clarify and promote the benefit to students of involving themselves in URC research</p> <p>[4.6] Assign reasonable number of advisees to faculty members; recognize those who are good advisors</p> <p>[4.7] Honor office hours and provide accessibility plan</p> <p>[4.8] Increase student awareness of tutoring / career development / professional school preparation type resources and software</p>	<p>[4.13] Introduce potential donors to faculty and students</p>	

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	<p>[4.10] Encourage greater use of project-based and inquiry-based learning methods in appropriate courses/disciplines</p> <p>[4.11] Make essay part of writing intensive course</p> <p>[4.12] Develop greater focus on scholarship opportunities</p>		
GA6: IFO Committees / University Policy			
a) Dean's Office	b) Department	c) Individual Faculty or Staff	
<p>[1.8] provide viable URC infrastructure to promote faculty mentorship</p> <p>[3.1] Explore possibility of joint appointments</p> <p>[3.4] raise admission standards, attract more well-prepared students</p>	<p>[1.5] connect with externals</p> <p>[3.1] Explore possibility of joint appointments</p> <p>[3.4] become school of choice for continuing ed opportunities for teachers</p>	<p>[1.1] More STEM in gen ed, via IFO gen ed committee</p> <p>[3.1] Explore possibility of joint appointments</p>	
GA7: Outreach			
a) Dean's Office	b) Department	c) Individual Faculty or Staff	
<p>[3.4] become school of choice for continuing ed opportunities for teachers</p>		<p>[1.5] connect with externals (Patti K)</p>	
GA8: Interdepartmental / Unit Communication			
a) Dean's Office	b) Department	c) Individual Faculty or Staff	
<p>[1.2] integrate recruiting efforts (outside CSET)</p>	<p>[1.3] Talk about integration of STEM</p>		

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<p>[1.2] new STEM specific recruiting strategy</p> <p>[2.3] Improve communication with RASP, URC, etc. so timelines and processes better accommodate “CSET-style” research.</p> <p>[3.4] raise admission standards, attract more well-prepared students</p>	<p>[2.4] Centralize CSET equipment inventory to avoid duplication, foster collaboration</p> <p>[2.2] Re-assess and optimize technical support staff roles and functions</p> <p>[2.5,6,8] CSET “Colloquium Series” on new teaching methods; intra-college teaching workshops to develop pedagogy, include visiting experts</p> <p>[2.9] Hold Intra-college assessment discussions to share information</p> <p>[3.1] Inventory disciplinary expertise across CSET</p> <p>[3.1] Assess course duplication in CSET and across colleges</p> <p>[3.3] Strengthen ties to Modelling and Simulation Center</p>		
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