



# COSMIC

COLLEGE OF SCIENCE AND MATHEMATICS INFORMATION CONNECTION

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## Dean's message

It is my pleasure to be writing this note as the new Dean of the College of Science and Mathematics. I joined the University of West Georgia in July 2016, after serving as Dean of the School of Science and Mathematics at The Citadel for four years. I was attracted to UWG after learning about all the exciting transformations introduced by President Marrero, from his vision that this be the best place to work, learn and succeed to the growth occurring campus-wide. My personal vision for the college is very similar to President Marrero's vision for UWG: not

only will we be the best place to work, learn and succeed, but we will be recognized for our STEM (Science, Technology, Engineering and Mathematics) mission both internally and externally. I am committed to helping put COSM at the forefront of STEM education in the region. This includes improving science literacy, preparing science and mathematics teachers, educating the future researchers and educators, and helping train tomorrow's workforce. We are certainly already doing all of these well and will continue to improve student, faculty and staff successes. Indeed, you can read a few of the recent success stories in this newsletter, with more to come! Whether you are a student, staff, faculty or alumnus, I look forward to getting to know you and working with you to bring a new era to COSM.

We have had a newsletter on and off since 2011 and I certainly look forward to bringing the COSMIC newsletter back on a regular basis. The current plan is to publish it twice a year. The focus of this "inaugural" issue is on introducing the COSM activities and office, and a few noteworthy news and events from around COSM. In the future, we will be incorporating news from each of the departments.

Last but not least, I should thank my predecessor, Dr. Scott Gordon, for agreeing to serve as the interim dean last year, as well as the whole staff in the COSM office. During this transition year, I have asked Scott, as well as Dr. Gregory Payne, to stay on as Interim Associate Deans given their experience working in the COSM office.

Go Wolves!

Lok C. Lew Yan Voon



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and Mathematics**

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## Upcoming Events

Homecoming: COSM tent (next to the Alumni Office tent) - October 22

Physics Demo Night : (Open to the community) 7:00-Crider Lecture Hall - October 28

## COSM STEM Education Initiatives

COSM has a history of leading initiatives to help students succeed in the STEM disciplines:

- The NSF-funded WISER program (\$250,000 over three years) examined evidence-based teaching and learning practices in STEM disciplines at West Georgia. The grant's authors and members of a Core Learning Team traveled to conferences on STEM education, a model institution (University of Maryland at Baltimore County) and conducted surveys among faculty on their teaching practices, and organized workshops and seminars to discuss issues pertaining to student success in STEM disciplines.
- The NSF-funded LSAMP program (\$250,000 over five years) supports minority STEM students through scholarships and faculty-mentored research. Since 2013, 55 UWG STEM students participated GA AL LSAMP, of which 19 graduated and pursuing higher education and/or joined the workforce. This year's cohort includes 14 STEM majors, of which 7 are new LSAMP scholars.
- The UWise program (\$300,000 over five years) took a multi-pronged approach to improving STEM education, including its Summer STEM Academy, peer research mentoring, and mini-grants aimed at faculty development. During 2012-16, many efforts (mini-grants, in particular) were recognized and disseminated under the auspices of the COSM Dean's Teaching and Learning Seminar Series on campus. The UWise program was also recognized in 2014 as the best program on campus (based on a competitive selection for programs and departments), and was a finalist at the Technology Association of Georgia (TAG) competition in 2014. A total of 224 student participated in the Summer STEM Academy, 160 students were involved in UWise-funded program as assistants or peer mentors, and approximately 800 students were impacted by teaching innovation explored via mini-grants.

COSM was recently awarded a grant from the same USG source as UWise (University System of Georgia's STEM Initiative) which has led to the formulation of the STEM Education Improvement Plan (SEEP). The program seeks to improve performance and in STEM core courses, retain and graduate science and mathematics majors, and prepare and support P-12 STEM teachers in Georgia's classrooms.

The components of the plan (described below) include (i) developing year-long STEM cohorts where incoming freshman STEM majors take courses together, (ii) using a variety of interventions to improve performance in core mathematics courses, (iii) supporting science and mathematics faculty using evidence-based teaching pedagogies in their classes, (iv) implementing an undergraduate research and mentoring program to improve student engagement in their chosen STEM field, and (v) implementing a tutoring program for students preparing for a career as P-12 STEM teachers.

1. **STEM Cohort Program.** In an effort to increase the retention and graduation rates of a larger proportion of STEM students, COSM will implement a STEM Cohort Program in which the incoming freshmen will be grouped together in core classes that include ENGL 1101 and 1102 courses specially designed for STEM majors (STEM to STEAM), XIDS 2002 (Thinking Like a Scientist) and a math class equipped with the interventions described below.
2. **Core Math Interventions.** MATH 1111 (College Algebra) has been a traditionally high DFW course at not only the University of West Georgia (DFW rates are typically around 30%), but also many other universities in the USG system and nationwide. COSM will introduce the use of the Emporium Model in MATH 1111, a model which has been implemented successfully at Georgia State and Georgia College and State University (among others) to reduce DFW rates in core math courses. The Emporium Model reduces number of hours of lecture, replacing them with supervised, hands-on work in a computer lab, developing mathematics skills using an artificially intelligent assessment and learning system.
 

MATH 1113 (Precalculus) is another traditionally high DFW course nationally, and at UWG (around 33%). Since MATH 1113 is the first required MATH course for all STEM majors at the university, decreasing the DFW rate in this one course should have a dramatic impact on the retention rate of STEM majors and, ultimately, the number of graduates with STEM degrees. We will reduce DFW rates in Precalculus by using a combination of intervention tutoring (for high-risk students) and supplemental instruction (for moderate-risk students).
3. **Faculty Mini-grants to Improve Core Science Courses.** STEM departments and faculty will be able to apply for funding to develop and implement evidence-based teaching and learning pedagogies in their science classes, with the goal of increasing student learning in those and subsequent courses. The selected mini-grants will include a focus on courses that have a major impact on STEM student's success and retention.

4. **Undergraduate Research and Mentoring Program.** The College of Science and Mathematics at the University of West Georgia prides itself on its history of providing research experiences for undergraduates. We believe these experiences allow students to forge strong bonds with the faculty research advisors and other students in the laboratory, increasing student engagement and rates of student success and retention in STEM fields. The SEEP program will combine grant funds with existing student research funds on campus to create research opportunities for freshmen and sophomores and employ upper-division students with research experience to act as mentors.
5. **Tutoring for Students in UTeach Program.** Attrition rates in COSM's Secondary Education Teacher training program (UTeach) have been problematic. Under the SEEP Program, COSM will implement peer tutoring and coaching programs for students in the UTeach program. Peer tutors will offer valuable tutoring to the UTeach students regarding content courses and lesson plan design but also help them navigate through heavy course load requirements with peer coaching.

## COSM Publications 2016

J.M. Whitmore, **J. Genz (Biology)**, M. Grossell, and R.W. Wilson. 2016. Measuring intestinal fluid transport in vitro: Gravimetric method versus non-absorbable marker. *Comparative Biochemistry & Physiology Part A*. 194: 27-36.

**H.G. Zot (Biology)**, **J.E. Hasbun (Physics)**, C.A. Michell, M. Landim-Vieirac, and J.R. Pinto. 2016. Enhanced troponin I binding explains the functional changes produced by the hypertrophic cardiomyopathy mutation A8V of cardiac troponin C. *Archives of Biochemical Biophysics*. 601: 97-104. DOI:10.1016/j.abb.2016.03.011

**H.G. Zot (Biology)** and **J.E. Hasbun (Physics)**. 2016. Modelling Ca<sup>2+</sup>-bound troponin in excitation-contraction coupling. *Frontiers in Physiology* 7: 406. DOI:10.3389/fphys.2016.00406

**M. Fujita (Chemistry)**, A.M. Kazerouni, J. Bacsá. 2016. Crystal structure of valinomycin-magnesium triflate hexahydrate complex. *Acta Crystallographica, Section C, Structural Chemistry C72*: 627-633 (Crystal structure used on cover page of journal).

**A.C. Gaquere-Parker (Chemistry)**, N. A. Doles, and C. D. Parker. 2016. Chemistry and Art in a Bag: An easy-to-implement outreach activity making and painting with a copper-based pigment. *Journal of Chemistry Education*. 93: 152-153.

A.A. Contractor, A.M. Kazerouni, A.R. Michmerhuizen, M.L. Falkenberry, R. Segovia, N.M. Blair, S.E. Kim, D.A. Vander Griend, J. Bacsá, **F.A. Khan (Chemistry)**, and **M. Fujita (Chemistry)**. 2016. The crystal structure of a 1:2 valinomycin:Ca<sup>2+</sup> complex and the multi-step solution equilibrium in acetonitrile characterized by <sup>1</sup>H NMR, UV-Vis, and mass spectrometry. *Supramolecular Chemistry*. DOI:10.1080/10610278.2016.1186276

B.F. Dattilo, R.L. Freeman, W.S. Peters, B. Heimbrock, **B. Deline (Geosciences)**, B. Martin, A.J. Kallmeyer, J. Reeder, and A. Argast. 2016. Giants among micromorphs: Were Cincinnatian (Ordovician, Katian) Small Shelly phosphatic faunas dwarfed? *Palaios* 31: 55-70.

I. Jo, **J.E. Hong (Geosciences)**, and K. Verma. 2016. Facilitating spatial thinking in world geography using web-based GIS. *Journal of Geography in Higher Education* 40 (3): 442-459.

**J.E. Hong (Geosciences)**. 2016. Social studies teachers' views of ICT integration. *Review of International Geographical Education Online* 6: 32-48.

F. Stonier and **J.E. Hong (Geosciences)**. 2016. Bridging GIS success. *The Geography Teacher* 13 (2): 52-60.

**J.E. Hong (Geosciences)**. 2016. Identifying skill requirements for GIS positions: A content analysis of job advertisements. *Journal of Geography* 115 (4): 147-158.

**J.E. Hong (Geosciences)** and K. Lee. 2016. The use of middle school alluses in the social studies classroom in South Korea. *International Journal of Geospatial and Environmental Research* 3 (1): Article 2 (available at <http://dc.uwm.edu/ijger/vol3/iss1/2>).

**J.E. Hong (Geosciences)**. 2016. The influence of feminist theory and perspectives on GIS research. *Geography* 101 (1): 42-46.

F. Al-Musallam and **A. Boumenir (Mathematics)**. 2016. The reconstruction of a source and a potential from boundary measurements. *Journal of Mathematical Analysis and Applications* 435: 800-808.

**A. Boumenir (Mathematics)**. 2016) An inverse problem in magnetohydrodynamics. *Contemporary Mathematics* 658: 1-7.

H.S. Chung, **V.K. Tuan (Mathematics)**, and S.J. Chang. 2016. Analytical Feynman integrals of functionals in a Banach algebra involving the first variation. *Chinese Annals of Mathematics Series B* 37: 281-290.

N. Dehgardi, M. Falahat, S.M. Sheikholeslami, and A. Khodkar (Mathematics). 2016. On the rainbow domination subdivision numbers of graphs. *Asian-European Journal of Mathematics* 9 (12pp).

- F. Demirkale, D. Donovan, J. Hall, **A. Khodkar (Mathematics)**, and A. Rao. 2016. Difference covering arrays and pseudo-orthogonal latin squares. *Graphs and Contributions* 32: 1353-1374.
- J.C. George, **A. Khodkar (Mathematics)**, and W. Wallis. 2016. *Pancyclic and Bipancyclic Graphs. Springer Briefs in Mathematics*. Springer. ISBN: 978-3-319-31950-6; 978-3-319-31951-3 05-02 (05C38).
- X. Gu (Mathematics)**, H.-J. Lai, P. Li, and **S. Yao (Mathematics)**. 2016. Edge-disjoint spanning trees, edge connectivity and eigenvalues in graphs. *Journal of Graph Theory* 81-16-29.
- X. Gu (Mathematics)**. 2016. Spectral conditions for edge connectivity and packing spanning trees in multigraphs. *Linear Algebra and its Applications* 493: 82-90.
- Y. Hong, **X. Gu (Mathematics)**, H.-J. Lai, and Q. Liu. 2016. Fractional spanning tree packing, forest covering and eigenvalues. *Discrete Applied Mathematics* 213: 219-223.
- N.T. Hong, P.V. Hoang, and **V.K. Tuan (Mathematics)**. The convolution for the Kontorovich-Lebedev transform revisited. *Journal of Mathematical Analysis and Applications* 440: 369-378.
- C.C. Jett (Mathematics)** 2016. Ivy League-bound: A case study of a brilliant African American male mathematics major. *Spectrum: A Journal on Black Men* 42: 83-97.
- G. Larnell, E. Bullock, and **C. Jett (Mathematics)**. 2016. Mathematics, social justice, and race: A critical race analysis of teaching mathematics for social justice. *Journal of Education* 196: 19-29.
- C. Leach (Mathematics)**. 2016. Proof without words: Powers of three and triangular numbers. *The College of Science and Mathematics Journal* 47: 120. DOI: 10.4169/college.math.j.47.2.120
- N.X. Thao, **V.K. Tuan (Mathematics)**, P.V. Hoang, and H.T. Hong. 2016. Asymptotics of the scattered Debye potentials via a generalized convolution. *Integral Transforms and Special Functions* 27: 126-136.
- V.K. Tuan (Mathematics)** and **N.S. Hoang (Mathematics)**. 2016. An inverse problem for a multidimensional fractional diffusion equation. *Analysis* 36: 107-122.

## External Grants 2016

- Andrew Edelman (Biology)**. Section 6 Endangered Species Grant, Alabama Division of Wildlife. Assessing distribution and habitat associations of eastern spotted skunks in Alabama.
- Andrew Edelman (Biology)**. Participating Agreement, U.S. Forest Service Shoal Creek Ranger District. Monitoring and study of wildlife at Talladega National Forest.
- Greg Payne (Biology)**. Resistance Monitoring in Bollworm and Tobacco Budworm Populations. Georgia Cotton Commission/Cotton Incorporated.
- Sharmistha Basu-Dutt (Chemistry)**. Enhancing the Nature of Science. US DoEd/UGA Teacher Quality Grant.
- Anne Gaquere-Parker (Chemistry)**. Chemistry and Art. US DoEd/UGA Teacher Quality Grant.
- Jung Hong (Geosciences)**. Effect of learning GIS on students' progression in geospatial concepts understanding. E. Willard and Ruby S. Miller Geography Education Research Grant Centennial Award. National Council for Geographic Education.
- Shea Rose (Geosciences)**. US DoEd/UGA. Energy Related Ideas. Teacher Quality Grant.
- Scott Gordon (Mathematics)**, **Scott Sykes (Mathematics)**, **Anne Gaquere-Parker (Chemistry)**, **Christopher Berg (Geosciences)**, and **Javier Hasbun (Physics)**. STEM Education Enhancement Plan (SEEP): Undergraduate Research and Mentoring Program. USG/BOR.
- Christopher Jett (Mathematics)**. Broadening Participation in STEM: A Quantitative analysis of African American Male STEM Majors' Mathematics Experiences and Career Decisions. NSF Teacher Quality Grant.
- Bruce Landman (Mathematics)**. 2016. Integers Conference 2016: Spanning the Generations. NSF.