

## **College of Science and Technology Annual Report for 2013 -2014**

The College of Science and Technology (CSAT) at Radford University (RU) was formed on July 1, 2007 by combining the Departments of Biology, Chemistry and Physics, Geology, and Mathematics and Statistics from the former College of Arts and Sciences and the Department of Information Technology from the former College of Information Science and Technology. On July 1, 2009, the Anthropology and Geography programs from the College of Humanities and Behavioral Science joined the Physics and Geology programs of the CSAT to form the School of Environmental and Physical Science (SEPS) in the CSAT. The Anthropology program was approved by SCHEV to become the Anthropological Sciences program on May 10, 2010. The Geography program was approved by SCHEV to become the Geospatial Science program on May 17, 2011. The faculty within the SEPS passed a motion to dissolve the SEPS with a director and to create departments with chairs on September 9, 2011. In a SEPS faculty meeting on November 11, 2011, Provost Minner announced that he had approved the proposal of the SEPS faculty members to form independent departments of Anthropological Sciences, Geology, Geospatial Science and Physics with individual department chairs as well as a laboratory coordinator position to serve the needs of the Anthropological Sciences, Geology, Geospatial Science and Physics Departments.

### **MISSION**

The College of Science and Technology prepares students with skills and expertise essential to the Commonwealth and the nation. The College emphasizes the theory and applications of science, mathematics, and technology. The College develops students' creative and critical thinking skills and teaches students to analyze problems and implement solutions to a vast array of challenges in our local, national and global communities. Students will be prepared to bring creative and socially responsible innovations to the workplace and to society.

### **UNDERGRADUATE DEGREES AND CONCENTRATIONS IN 2013-14**

- Anthropological Sciences - concentration in Forensic Anthropology
- Biology with concentrations in General Biology, Molecular Biology, Environmental Biology, Pre-health and Biology Medical Laboratory Sciences
- Chemistry with concentrations in Professional Chemist, Pre-health Professional, Biochemistry and Forensics as well as an Environmental Science option
- Computer Science and Technology with concentrations in Computer Science, Database, Software Engineering and Networks
- Geology with concentrations in General Geology, Engineering and Environmental Geosciences and Earth Sciences
- Geospatial Science with concentrations in Environmental and Geoinformatics
- Information Science and Systems with concentrations in Information Systems and Web Development
- Mathematics with concentrations in Applied Math, Statistics and Secondary Education
- Physics with concentrations in Physics Education and Earth and Space Science

## GOALS AND ACCOMPLISHMENTS FOR 2013-2014

These goals are based on the roles and responsibilities of deans as described in section 4.1.3.1 on page 62 of the Radford University Teaching and Research Faculty Handbook.

**- to lead the faculty and staff of the college in developing and delivering educational opportunities of the highest quality possible for students, consistent with the mission of the College,**

**Goal:** Explore efforts to enhance student retention through collaborations with Noel-Levitz and the Radford University Office of Student Retention

**Status:** On Monday, August 12, 2013 I attended a presentation by Dr. Dave Trites of Noel-Levitz about the opportunities for studying and enhancing student retention. I later met with Dr. Joel Hagen, Biology Department Chair, and invited the Biology Department to consider administering the College Student Inventory (CSI) to the freshmen biology majors who were enrolled in BIOL 160 Introductory Seminar in Biology in the fall semester of 2013. The department accepted this invitation and administered the CSI to the 92 new freshmen biology majors enrolled in six sections of BIOL 160. Individual reports and class debriefs were conducted with all sections, and class assignments were made related to the CSI results. The goals of the CSI are to connect with new students earlier, to engage students in reflective discussions about developing their strengths and overcoming their weaknesses, to inform students about resources and to refer them to service offices if appropriate. A presentation by the Office of New Student Programs, Retention Team and representatives from Residential Life was made on February 28, 2014 about the Noel-Levitz CSI administration in BIOL 160. Data from that presentation revealed that approximately 60% of the BIOL 160 students were retained in the Biology major into spring 2014, but the remaining 40% of the BIOL 160 students changed majors, did not enroll in the spring semester, were on academic probation or were suspended. These and other results from the CSI are being used by the Biology Department to consider the best sequence of courses for biology majors in their first year, whether new freshmen should declare a major in biology or in pre-biology and other curricular issues related to the Biology core courses for majors. The value of a learning community is also being discussed, and plans are being made for BIOL 131 Ecology and Adaptation, the first lab course for biology majors and UNIV 100 Introduction to Higher Education, to be taught in Stuart Hall as linked courses with shared living and learning space, tutoring and upper-class mentors in the fall semester of 2014. Students enrolled in these courses may also be enrolled in BIOL 160 which would serve as an additional cohort-building experience for freshmen Biology majors. Stuart Hall is a residence hall where many CSAT majors live, the location of the CSAT Advising Center, and the weekly meeting site of the CSAT STEM Club. The Office of Student Retention, the Office of New Student Programs and the Office of Residential Life will be working in consultation with the Department of Biology to study and enhance the retention rate of freshmen biology majors. Lessons learned from this collaboration could inform the work of other departments in the CSAT who are making efforts to increase the retention rate of their freshmen majors.

**Goal:** Support the development of online and hybrid instructional delivery methods

**Status:** Two departments are online course delivery pioneers in the CSAT. The Department of Information Technology has a successful distance education degree completion program that

provides online delivery of courses for students to complete the Computer Science degree with concentrations in Database and Software Engineering. The Department of Mathematics and Statistics teaches the graduate level content courses for the M.S. in Education with a concentration in Mathematics Education degree program as online courses. The Department of Information Technology taught two courses during Wintermester 2012-13 and 2013-14. Funds were provided from the CSAT Dean's Office budget to pay stipends for each for the following faculty members to develop online courses during 2013-14. These include Dr. Andrew Foy for GEOS 250, Dr. Jake Fox for ANSC 101, Ms. Carrie Case for STAT 200, Dr. Steve Fawthrop for MATH 126 and Dr. Stockton Maxwell for GEOG 201.

Dr. Jake Fox taught ANSC 101 Anthropology of the Human Past as an online course in fall 2013 and as a Wintermester course in 2013-14. He plans to teach it in Wintermester 2014-15. Dr. Andrew Foy is teaching GEOS 250 as an online course in spring 2014, and he plans to teach it in Wintermester 2014-15.

Approval was granted by Provost Minner to use funds from the budget for the M.S. in Education in Earth and Environmental Science program to pay stipends for faculty members in Geology, Geospatial Science and Physics to develop online courses that will support that proposed graduate program. The following faculty members have been provided stipends to develop online courses during 2013-14.

Dr. Andrew Foy – Geospatial Resources and Technologies for Science Educators

Dr. Jon Tso – Geology of Virginia

Dr. Chester "Skip" Watts – Hydrogeology

Ms. Mythianne Shelton – Energy and the Environment and the History of Science

**Goal:** Support development of innovative, collaborative and alternative learning opportunities

**Status:** Faculty members in the CSAT submitted proposals that were supported by a combination of funds provided by Provost Minner and Radford University. There were five Audeamus projects funded for a total of \$36,075. These projects included the following.

Dr. Anthony Curtis, \$9,912, Radford University Biome Integrative Exchange Sites (RUBIES)

Dr. Jason Davis, \$4,500, SCORE Project – Scientific Outreach and Research Engagement

Dr. Sara O'Brien, Dr. Anthony Curtis, and Mr. Eric Weigel, \$9,000, Study Smart, Not Hard: An Alternative Method of Course Delivery for BIOL 322

Dr. Tara Phelps-Durr and Dr. Bob Sheehy, \$5,700, Flipping the Classroom: BIOL 231 Course Revision Proposal

Dr. Prem Uppuluri, Dr. Jeff Pittges, Dr. Joe Chase and Dr. Art Carter, \$6,963, Dedicated Active Learning and Research Environment (DARE)

RU Faculty Research Grants were provided to Dr. Tiffany Carpenetti, Dr. Peter Christmas, Dr. Gary Coté, Dr. Anthony Curtis, Dr. Jeremy Wojdak and Dr. Anthony Dove. Four of these grant projects will provide stipends for students to conduct this work with their faculty mentors.

Funding from the CSAT Dean's Office budget has been provided to support the development of the Radford Amazonian Research Experience (RARE) project that is coordinated by Dr. Jason Davis, Assistant Professor of Biology. This project plans to establish an undergraduate-focused research site and opportunities for external grant funding.

Funding from the CSAT Dean's Office budget was provided to Dr. Kimberly Lane and Dr. Tim Fuhrer in the Chemistry Department and Dr. Tara Phelps-Durr in the Biology Department to assist with purchasing MolSoft molecular modeling software that is used in chemistry and biology instruction and faculty/student collaborative research.

Funding from the CSAT Dean's Office budget was provided to Dr. Rhett Hermann to assist with purchasing software for his research in geophysics.

Funding from the CSAT Dean's Office budget was provided to Dr. Bob Sheehy to assist with repair of the Selu weather station that collects data for ecological and field research, to Dr. Laura Gruss to maintain the anatomical specimens in the human anatomy lab and to Mr. Darrell White to provide new shade cloth for the Biology Department Greenhouse.

Funding from the CSAT Dean's Office budget was provided for the electrical utility and venting installation required for the operation of new equipment in the Biology, Chemistry and Physics Departments and for swipe card access door locks in the Biology Department.

**Goal:** Support the development of graduate degree and new undergraduate degree program proposals

**Status:** The Department of Information Technology has proposed the M.S. degree in Data and Information Management that has passed all levels of approval in the CSAT and is currently being reviewed and revised in consultation with State Council of Higher Education for Virginia. This innovative degree program will be proposed for approval at the Radford University Board of Visitors in May of 2014 with an anticipated starting date of August 2014. This degree program would be the first graduate degree awarded exclusively in the College of Science and Technology and the first graduate degree in Data and Information Management in the Commonwealth of Virginia.

A M.S. in Education with a concentration in Content Studies in Earth and Environmental Science degree program has also been proposed. The Planning Committee for this graduate degree consists of Ms. Mythianne Shelton, Special Purpose faculty member in Physics, Dr. Jonathan Tso, Chair of the Department of Geology, Dr. Richard Roth, Chair of the Department of Geospatial Science, and Dr. Patricia Shoemaker, Dean of the College of Education and Human Development. This proposed degree program has a plan for its curriculum, and faculty are currently creating online versions of the lecture components of the courses. The three areas being proposed within this degree program are endorsement in Earth and Space Science, a concentration in Geology and a concentration in Environmental Science. A position description was also developed and submitted to search for a coordinator for this new graduate degree program. A final report from the committee planning this new degree program was submitted to Provost Minner on May 13, 2013.

The Department of Geology has proposed a new B.S. degree in Geological Engineering that would be accredited by the Accreditation Board for Engineering and Technology (ABET). This proposal was submitted on the CSAT 2014-15 New Initiative Requests.

**Goal:** Support efforts to achieve American Chemical Society approval for the Department of Chemistry

**Status:** Faculty members in the Department of Chemistry made a presentation entitled, “An ACS-Approved Degree in Chemistry from Radford University, A Path Forward: Addressing Faculty Resources” to Provost Minner and me on Friday, March 29, 2013 to being discussing how the Department of Chemistry could gain support for pursuing American Chemical Society (ACS) approval, i.e. accreditation. Dr. Minner asked the Chemistry Department to provide evidence of the resources that would be needed to pursue ACS approval and to describe how the investments would improve teaching and learning in the Chemistry Department. The Chemistry Department formed a committee to begin the initial work on collecting the specific evidence of the resources that would be required to achieve ACS approval. An additional meeting with the Department of Chemistry and Dr. Minner was held where Dr. Minner demonstrated his support of the Chemistry Department efforts to pursue ACS approval by announcing that ACS approval was his first programmatic priority in the 2014-15 new budget initiative requests. Dr. Minner continued to provide his support for ACS approval of the Chemistry Department with presentations to the Radford University Board of Visitors on February 4, 2014 that cited the Chemistry Department as a Program of Distinction that was worthy of funding to pursue ACS approval. The funding requested for this project included four new tenure-track faculty positions as well as an instrument technician position and an administrative assistant designated for the Department of Chemistry. Funds would also be provided for research equipment, software and laboratory course supplies. The Radford University Board of Visitors approved the resolution and funding to support the Department of Chemistry proposal to pursue ACS approval.

**- to lead the College in procuring and managing fiscal, human, and physical resources necessary to accomplish these goals,**

**Goal:** Pursue new relationships with corporate partners and continue to pursue gifts to the CSAT

**Status:** A new relationship with a funding partner has been established through a collaborative effort with Robyn Porterfield in the Office of Advancement. A grant proposed submitted to the Jessie Ball DuPont Fund for the Summer Bridge Program was funded for \$105,500 over three years to support an expansion of the program to 96 girls and the addition of a track in Environmental Science. A new partnership with the CSAT has also been established through a collaborative effort with Joanne Royalty in the Office of Advancement. A grant proposal submitted to The Harry and Zoe Poole Foundation for the Summer Bridge Program was funded for \$10,000 for the summer of 2014 to provide scholarships to ten girls in northern Virginia to attend Summer Bridge Program. As of March 28, 2014 corporate partners, foundations and individuals have provided \$110,000 to fund the Summer Bridge Program for 2014, and one proposal is pending that has requested \$5,000.

Additional efforts to explore new partnerships with corporations and the CSAT include a meeting on Tuesday, August 27, 2013 with the executive leadership team of Roanoke Gas in consultation with Robyn Porterfield and David Horton. They were provided an overview of the facilities in the Center for the Sciences and a tour of the construction site from the periphery of the site. On September 16, 2013 David Horton, Robyn Porterfield and I met with David Grimes from Multivision to explore a relationship and opportunities to hire our Information Technology Department interns and graduates. On December 5, 2013 Robyn Porterfield and I met with Mr. John R. Nelson, Executive Vice President and Chief Technology Officer for Altria Group, Inc. in Richmond to explore a possible partnership with Atria and a naming opportunity in the Center

for the Sciences. On Tuesday, January 28, 2014 Joanne Royaltey and I met with RU alumni at Systems Made Simple as well as another prospective donor in Manassas, Virginia to discuss the M.S. in DAIM proposal as well as naming opportunities in the Center for the Sciences. Dr. Art Carter, Dr. Jeff Pittges, Ms. Robyn Porterfield and I met with Doug Juanarena and Tom Weeks at Rackspace in Blacksburg on Wednesday, January 8, 2014 to discuss the opportunities for an Information Technology Department research and development lab that would support the M.S. in DAIM degree proposal and faculty/undergraduate student collaborative research projects.

**Goal:** Support the efforts of faculty members to achieve a goal of 26 external grant submissions and 13 external grant awards

**Status:** From July 1, 2013 through March 24, 2014, 17 external grant proposals have been submitted by CSAT faculty and staff based on information provided by the Office of Sponsored Programs and Grants Management. These 17 external grant submissions represent funding requests of \$3,913,708. From July 1, 2012 until March 28, 2013, there were 17 external grant proposals submitted worth \$2,378,744. Six external grants have been awarded from July 1, 2013 through March 24, 2014 that represented \$293,656 in funding. From July 1, 2013 until March 28, 2013, four external grants were awarded that represented \$107,346 in funding.

**- to represent the college, its goals and needs to other external as well as internal constituencies, and**

**Goal:** Continue to communicate with all constituents of the CSAT through the CSAT newsletter and alumni newsletter, CSAT website, CSAT Facebook page and by meeting with departments and faculty members

**Status:** The CSAT newsletter *From the Dean's Desk* that is written and designed by David Horton, Assistant to the Dean, continues to be successful in communicating news to CSAT faculty, staff and friends. David has expanded *From the Dean's Desk* from a four page newsletter to nearly a magazine that often exceeds fifteen pages and is content, graphic and photographic intensive. Editions of *From the Dean's Desk* are made possible by the faculty, staff and students of the CSAT who report their successes to David for inclusion in the newsletter. David has also enormously enhanced the CSAT Facebook page and website by very frequent updates that feature articles, videos, photographs and links to CSAT faculty and students activities. CSAT holiday greeting cards were mailed to donors who had made contributions to the CSAT in 2013.

**- to promote the overall excellence and welfare of the University**

**Goal:** Support positive morale among faculty and staff across the CSAT by listening to faculty concerns and soliciting faculty input in decisions affecting the CSAT

**Status:** I continue to meet with CSAT faculty ranging from individuals with specific requests to concerns from departments. The meeting agendas ranged from requests for resources to concerns raised by students and parents. I am happy to write letters of support for many faculty members to assist in their applications for grant proposals and nominations for awards.

**Goal:** Support efforts to engage alumni in the work of the CSAT

**Status:** The College of Science and Technology Advancement events during the 2013-14 academic year included the annual meeting of the CSAT Alumni Advisory Council that was conducted from 10:00 a.m. until 2:00 p.m. in 248/249 Heth Hall on Friday, October 18, 2013. An update was provided from the dean and the department chairs on events and activities within their departments. We were also joined by Ms. Laura Turk, Director of Alumni Relations. The meeting ended with a tour of Reed and Curie Halls and the construction site for the Center for the Sciences.

On Thursday, June 20, 2013 I met with Dr. Ray Tuck, a 1994 Physical Science alumnus and Ms. Meredith Fox to thank Dr. Tuck for his support of the CSAT through establishing the Dr. Nathaniel R. Tuck, Sr. Memorial Student Scholarship. On Monday, September 16, I met with Biology alumna Ms. Nancy Artis and her husband Dr. H. Pat Artis for lunch and to discuss opportunities for them to continue their long term and generous support of CSAT missions. Robyn Porterfield and I plan to visit a chemistry alumnus in North Carolina on April 21, 2014. Other alumni projects undertaken this year in consultation with David Horton include an alumni speakers' bureau and preliminary discussion of alumni awards that could be presented by the CSAT. This will be discussed by the CSAT Leadership Team and CSAT Advisory Council.

**Goal:** Support efforts to enhance the academic reputation of the CSAT and Radford University

**Status:** The academic reputation of the CSAT and Radford University is enhanced by the achievements of the faculty and students of the CSAT. I am privileged to represent the CSAT and to share the achievements of the faculty, staff and students.

On Thursday, July 11, 2013, I joined President Kyle, Mr. Richard Alvarez, Ms. Lisa Ridpath, Mr. Chris Willis and Dr. Jack Brockway, Associate Professor of Physics, to provide a tour of Reed and Curie Halls to Delegate Joseph Yost, a Radford alumnus. On Friday, September 6, I met with representatives from the Department of Planning and Budget in Richmond to provide them a tour of Reed and Curie Halls and to answer their questions about needs for renovation of Reed and Curie Halls. I also met with Rich Silwoski, Director of the Department of General Services in Richmond, on Monday, November 18, 2013 to provide him a tour of Reed and Curie Halls and to answer his questions about the need for the renovation of Reed and Curie Halls. On May 8, 2013 I served as a panelist for the MGNT 322 Better Business Builders panel presentation to convey the value of STEM disciplines in promoting economic growth. I met with a group of prospective students from the Roanoke Valley Governor's School on Tuesday, November 12 to present information about the CSAT and the Chemistry Department.

The academic reputation of the CSAT is enhanced every time the CSAT faculty and students accomplish our teaching, research and service missions. Teaching successes include innovative pedagogical approaches such as flipping the classroom and assessing student learning through innovations such as Learning Catalytics. Research successes include faculty members who mentor student research and supervise their research presentations at national conferences and meetings. Service and outreach successes include all the science, technology and mathematics education and outreach events that are possible through the work of the CSAT faculty and staff. These events include but are not limited to Science Days sponsored by the Science Alliance of Geology, Physics, Chemistry, Biology and Anthropological Sciences. Faculty in Mathematics

and Statistics, Chemistry and the FSI support the STEM Conference at the Southwest Virginia Higher Education Center in Abingdon. The programming, gaming and cyber defense competitions sponsored by the Department of Information Technology enhance the academic reputation of the CSAT among high schools and community colleges. Study abroad trips to the Galapagos and to St. John in the U.S. Virgin Islands by the Biology Department, and the highly successful trip to Barrow, Alaska where Dr. Rhett Herman, Ms. Mythianne Shelton and Mr. Dan Blake conducted geophysics and science education research with RU and Southwest Virginia Governor's School students enhance the academic reputation of the CSAT. The geological research conducted by Dr. Skip Watts and Mr. George Stephenson at Mountain Lake and the alternative spring break trip of Dr. Rick Roth and Dr. Christine Small to plant trees on land reclaimed from strip mining have enhanced the academic reputation of the CSAT.

Other educational outreach events sponsored and supported by the CSAT faculty include the AMC Mathematics Competition on Tuesday, February 4, 2014 that was coordinated by Mr. John McGee, Instructor of Mathematics. Another outreach and recruiting event for prospective students this spring was the Blue Ridge Highlands Regional Science Fair on March 7 and 8 that is co-directed by Dr. Christine Hermann and Dr. Kimberly Lane in the Department of Chemistry. CSAT faculty member Dr. Karen Powers, Dr. Neil Sigmon and Dr. Steve Fawthrop served as judges for the SuperMACC Tournament that was sponsored by the CSAT and conducted on Monday, March 24, 2014. CSAT faculty members are planning to teach on Saturday, March 29, 2014 for the Science Exploration Day outreach event, and these include Dr. Ian Barland, Dr. Jack Brockway, Dr. Jason Davis, Dr. Steve Lenhart, Dr. Andrew Ray, Dr. Neil Sigmon, Mr. Eric Weigel and Dr. Cassady Yoder.

The academic reputation of the CSAT is also promoted to prospective students in grades 1-6 through Camp Invention that was conducted last summer during June 23-28, 2013. Summer Bridge Program enhances the academic reputation of the CSAT for high school girls. Summer Bridge Program was conducted from July 7-12, 2013, and the CSAT faculty members who taught courses in Summer Bridge Program were Dr. Rhett Herman and Ms. Brenda Hastings, Mr. George Stephenson and Mr. Vik Liogys, Dr. Georgia Hammond and Dr. Kimberly Lane, and Dr. Hwajung Lee, Dr. Cliff Boyd and Dr. Donna Boyd.

Finally, the academic reputation of the CSAT has recently been enhanced due to the outstanding work of Dr. Donna Boyd that has resulted in approval for Radford University to be granted a charter for a chapter of Sigma Xi, the Scientific Research Society in September of 2014. This achievement is additional external validation of the quality of scientific research at Radford.

#### **Professional Development for 2013-14**

I attended the American Association of Colleges and Universities Annual Meeting in San Diego, California during October 31-November 2, 2013. The theme of this meeting was "Transforming STEM Education: Inquiry, Innovation, Inclusion, and Evidence" The issues discussed at this annual meeting included persistence in science education by all students, advanced scientific thinking and integrative reasoning skills, evidence based practices and policies that are transforming STEM education, and technology and multimedia in STEM teaching and learning. These sessions and the resulting discussions were interesting, and I have been able to use the knowledge I gained to inform the work of the CSAT Leadership Team.