



TENNESSEE TECH UNIVERSITY  
ANNUAL REPORT 2017-18

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*Office of Research*

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# MISSION OF THE OFFICE OF RESEARCH

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The mission of the Office of Research is to support faculty in developing strong research programs and producing quality competitive research proposals. Whether locating funding opportunities, providing easy access to policies, or assisting in proposal preparation, the goal is to offer effective strategies, responsive information, and tangible assistance to the Tennessee Technological University community.

The Office of Research supports the Principal Investigator and provides services for proposals, award management, contract and license negotiation, data access and support services, research administration, and regulatory compliance.

The personnel of the Office of Research support the University's mission by:

- Facilitating the identification of funding opportunities;
- Training and assisting with proposal development;
- Submitting proposals to funding agencies;
- Monitoring projects and research to ensure regulatory compliance;
- Negotiating agreements, contracts, and grants;
- Coordinating training for compliance of agreements, contracts, and grants;
- Facilitating the protection of intellectual property and technology transfer;
- Reviewing sponsor guidelines and identifying key issues;
- Facilitating meetings with the Principal Investigator, Business Office, and other appropriate departments and units;
- Collaborating with university and community stakeholders, as appropriate during the proposal process;
- Assisting with electronic submission of proposals; and
- Completing forms for certification, as necessary.

# SUMMARY OF ACTIVITIES

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During fiscal year 2017-18, the University's Mission was supported through the Office of Research in the following ways:

- Grants and contracts externally funded numbered 170 with a value of \$16,371,900, which represents a decrease of 3% from the 2016-17 total of \$16,910,722.
- Grants and contracts received through the three Centers of Excellence; the Cybersecurity Education, Research and Outreach Center; and the STEM Center numbered 107 with a value of \$10,159,641, which represents 60% of total dollars and 63% of the total number of grants and contracts received.
- Grants and contracts received through federal agencies numbered 100 with a value of \$9,618,095, which represents 59% of grants and contracts and 59% of total dollars received.
- Grants and contracts received through state agencies numbered 45 with a value of \$6,033,551, which represents 26% of the total number of grants and contracts and 37% of total grant and contract dollars received.
- Private contracts were at 24 with a value of \$650,244, which represents 14% of the total number of grants and contracts and 4% of total grant and contract dollars.
- Local funding came in at 1 with a value of \$70,010, which represents 0.6% of grants and contracts and 0.4% of total grant and contract dollars.
- Grants and contracts received for research numbered 110 with a value of \$10,366,042, which represents 65% of the total number of grants and contracts and 63% of total dollars received.
- Grants and contracts received for public service numbered 38 with a value of \$4,407,330, which represents 22% of all grants and contracts and 27% of total grant and contract dollars received.
- Instruction funding received numbered 11 with a value of \$1,042,921, which represents 6% of total number of grants and contracts and 6% of total grant and contract dollars.
- Grants and contracts received for student services/scholarships numbered 7 with a value of \$337,709, which represents 4% of the total number of grants and contracts and 2% of total dollars received.

- Academic Support funding accounted for 4 contracts with a value of \$217,898, which represents 2% of the total number of grants and contracts and 1% of total grant and contract dollars.
- Internal funds were provided in the amount of \$96,915 for small grants to support faculty research. Nine Track I proposals from 9 faculty were funded for a total of \$26,995, and 7 Track II proposals from 8 faculty were funded for a total of \$69,920.
- The top funding agencies were the Tennessee Higher Education Commission at \$3,880,128; National Science Foundation at \$2,139,225; the Tennessee Department of Safety and Homeland Security at \$1,175,075; and the Tennessee Department of Education at \$1,494,424.
- Proposals submitted for external funding numbered 186 with a value of \$54,309,574.
- Proposals submitted through the three Centers of Excellence; the Cybersecurity Education, Research, and Outreach Center; and STEM Center numbered 121 with a value of \$33,651,524, which represents 65% of proposals submitted and 62% of funds requested.
- Proposals submitted to federal agencies numbered 113 requesting \$41,613,923, which represents 61% of proposals submitted and 77% of dollars requested.
- Proposals submitted to state agencies numbered 46 requesting \$11,300,036, which represents 25% of proposals submitted and 21% of dollars requested.
- Proposals submitted to private agencies numbered 26 requesting \$1,325,605, which represents 14% of proposals submitted and 2% of dollars requested.
- Proposals submitted to local agencies numbered 1 requesting \$70,010, which represents 0.5% of proposals submitted and 0.1% of dollars requested.

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# FIGURE 1

## External Funds Historical FY 2009-2018



# Table I

## Externally Funded Projects by Department of Project PI\* FY 2017-18

PI's College	PI's Department, Center, or Unit	Centers of Excellence			STEM Center	CEROC	Departments/ Other Units	Total
		Energy Center	Manufacturing Center	Water Center				
Agriculture and Human Ecology	Administration					\$85,000	\$85,000	
	Agriculture			\$337,150		\$236,816	\$573,966	
	Human Ecology					\$180,806	\$180,806	
<b>Subtotal</b>				<b>\$337,150</b>		<b>\$502,622</b>	<b>\$839,772</b>	
Arts and Sciences	Biology			\$197,801			\$197,801	
	Chemistry			\$479,644		\$252,058	\$731,702	
	Cooperative Fisheries Research Unit			\$265,809		\$30,000	\$295,809	
	Earth Sciences					\$87,294	\$87,294	
	Physics	\$99,367				\$374,299	\$473,666	
<b>Subtotal</b>		<b>\$99,367</b>		<b>\$943,254</b>		<b>\$743,651</b>	<b>\$1,786,272</b>	
Business	Business Media Center					\$2,417,762	\$2,417,762	
	Decision Sciences and Management					\$91,772	\$91,772	
	Small Business Development Center					\$214,140	\$214,140	
<b>Subtotal</b>						<b>\$2,723,674</b>	<b>\$2,723,674</b>	
Education	Education Administration					\$106,083	\$106,083	
	Curriculum and Instruction					\$1,271,438	\$1,271,438	
<b>Subtotal</b>						<b>\$1,377,521</b>	<b>\$1,377,521</b>	
Engineering	Administration	\$49,000				\$37,092	\$86,092	
	Basic Engineering					\$2,500	\$2,500	
	Chemical Engineering	\$87,965	\$5,000	\$101,563			\$194,528	
	Civil and Environmental Engineering	\$245,157		\$185,193			\$430,350	
	Computer Science	\$291,899	\$115,007				\$406,906	
	CEROC		\$227,131			\$135,245	\$362,376	
	Electrical and Computer Engineering	\$325,952	\$624,179				\$950,131	
	Manufacturing and Engineering Technology	\$24,503	\$334,284				\$358,787	
Mechanical Engineering	\$99,704	\$1,093,729		\$40,360		\$1,369,766		
<b>Subtotal</b>	<b>\$1,124,180</b>	<b>\$2,399,330</b>	<b>\$286,756</b>	<b>\$40,360</b>	<b>\$135,245</b>	<b>\$175,565</b>	<b>\$4,161,436</b>	
Fine Arts	Appalachian Center for Craft					\$7,000	\$7,000	
	Music					\$33,638	\$33,638	
<b>Subtotal</b>						<b>\$40,638</b>	<b>\$40,638</b>	
Interdisciplinary Studies	Environmental Studies			\$103,186			\$103,186	
<b>Subtotal</b>				<b>\$103,186</b>			<b>\$103,186</b>	
Nursing	Nursing					\$300,000	\$300,000	
<b>Subtotal</b>						<b>\$300,000</b>	<b>\$300,000</b>	
Centers of Excellence	Energy Center Appropriation	\$916,600					\$916,600	
	Energy Center Testing	\$2,090					\$2,090	
	Energy Center (Other)	\$68,764					\$68,764	
	Manufacturing Center Appropriation		\$1,505,500				\$1,505,500	
	Manufacturing Center Testing		\$70,010				\$70,010	
	Water Center Appropriation			\$1,163,700			\$1,163,700	
	Water Center Testing			\$102,866			\$102,866	
Water Center (Other)			\$492,561			\$492,561		
<b>Subtotal</b>		<b>\$987,454</b>	<b>\$1,575,510</b>	<b>\$1,759,127</b>			<b>\$4,322,091</b>	

# Table I continued

		Centers of Excellence								
PI's College	PI's Department, Center, or Unit	Energy Center	Manufacturing Center	Water Center	STEM Center	CEROC	PI's College	PI's Department, Center, or Unit		
Other	Counseling Center						\$88,311		\$88,311	
	Facilities						\$35,922		\$35,922	
	Graduate Studies						\$35,000		\$35,000	
	Online and Distance Education						\$71,355		\$71,355	
	Minority Affairs	\$34,263							\$34,263	
	Office of Research and Economic Dev.						\$118,000		\$118,000	
	STEM Center				\$334,459				\$334,459	
<b>Subtotal</b>		<b>\$34,363</b>			<b>\$334,459</b>		<b>\$348,588</b>		<b>\$717,310</b>	
<b>Total</b>	<b>All Units</b>	<b>\$2,245,264</b>	<b>\$3,974,840</b>	<b>\$3,429,473</b>	<b>\$374,819</b>	<b>\$135,245</b>	<b>\$6,212,259</b>		<b>\$16,371,900</b>	

Note: Numbers indicate amount awarded during 2017-18. Actual expenditures are not reflected.

## TABLE II

### Proposals Submitted and Awards Received By University Unit FY 2017-18

University Unit	Proposals Submitted		Awards Received***	
	<i># of Proposals</i>	<i>Amount Requested</i>	<i># of Awards</i>	<i>Amount Received</i>
Administration*	3	\$255,916	2	\$124,233
Agriculture and Human Ecology*	6	\$1,073,884	6	\$502,622
Arts and Sciences*	12	\$1,098,874	12	\$743,651
Business Administration*	14	\$2,657,674	17	\$2,841,674
CEROC	3	\$332,463	2	\$135,245
Education*	18	\$14,850,577	16	\$1,377,521
Engineering*	6	\$540,481	4	\$175,565
Energy Center**	41	\$13,348,889	29	\$2,245,264
Graduate Studies	1	\$35,000	1	\$35,000
Library*	0	\$0	1	\$71,355
Manufacturing Center**	45	\$12,913,084	33	\$3,974,840
Fine Arts	3	\$29,500	3	\$40,638
Interdisciplinary Studies*	1	\$24,960	0	\$0
Nursing*	1	\$91,184	1	\$300,000
STEM Center**	3	\$2,523,861	6	\$374,819
Water Center**	29	\$4,533,227	37	\$3,429,473
<b>Total</b>	<b>186</b>	<b>\$54,309,574</b>	<b>170</b>	<b>\$16,371,900</b>

\* Without Centers of Excellence, CEROC, or STEM Center

\*\*See Table III

\*\*\*Amount awarded by agency during 2017-18. Does not represent actual expenditures on project.

NOTE: The number of awards received may be greater than the number of proposals submitted because proposals submitted in previous years could be awarded in the current year. Similarly, the amount funded may be greater than the current requested for the same reason.

# TABLE III

## Proposals Submitted and Awards Received Through Centers of Excellence and STEM Center by Academic Unit FY 2017-18 Energy Center

Center/Academic Unit	Proposals Submitted		Awards Received*	
	# of Proposals	Amount Requested	# of Awards	Amount Received
Center	2	\$908,090	3	\$918,690
Center/Agriculture	1	\$175,000	0	\$0
Center/Computer Science	1	\$359,696	0	\$0
Center/Mechanical Engineering	2	\$437,583	1	\$68,764
Chemical Engineering	5	\$854,237	3	\$87,965
Chemical Engineering/Earth Sciences	1	\$123,893	0	\$0
Chemical Engineering/Electrical and Computer Engineering	1	\$595,186	0	\$0
Chemical Engineering/Civil and Environmental Engineering/Political Science	1	\$3,000,000	0	\$0
Chemical Engineering/Mechanical Engineering	2	\$495,938	0	\$0
Civil and Environmental Engineering	3	\$627,499	6	\$245,157
Civil and Environmental Engineering/Earth Sciences	1	\$349,993	0	\$0
Computer Science	4	\$1,045,495	3	\$291,899
Computer Science/Electrical and Computer Engineering	2	\$764,871	0	\$0
Electrical and Computer Engineering	7	\$2,164,017	3	\$88,696
Electrical and Computer Engineering/ Chemical Engineering	1	\$364,767	1	\$107,080
Electrical and Computer Engineering/ Manufacturing Center	0	\$0	1	\$130,176
Manufacturing and Engineering Technology	1	\$24,503	1	\$24,503
Mechanical Engineering	3	\$756,684	2	\$99,704
Mechanical Engineering/Engineering	0	\$0	2	\$49,000
Minority Program/Student Success Center				
Minority Affairs	0	\$0	1	\$34,263
Physics	2	\$262,558	2	\$99,367
Student Success Center	1	\$38,879	0	\$0
<b>Total</b>	<b>41</b>	<b>\$13,348,889</b>	<b>29</b>	<b>\$2,245,264</b>

\*Amount awarded by agency during 2017-18. Does not represent actual expenditures on project.

## TABLE III continued

### Proposals Submitted and Awards Received Through Centers of Excellence and STEM Center by Academic Unit FY 2017-18 Manufacturing Center

Center/Academic Unit	Proposals Submitted		Awards Received*	
	<i># of Proposals</i>	<i>Amount Requested</i>	<i># of Awards</i>	<i>Amount Received</i>
Center	2	\$1,564,210	3	\$1,575,510
Center/Chemical Engineering	1	\$383,743	0	\$0
Chemical Engineering	2	\$996,730		
Chemical Engineering/Nursing	0	\$0	1	\$5,000
Chemical Engineering/Civil and Environmental Engineering/ Manufacturing and Engineering Technology/Mechanical Engineering	1	\$1,816,931	0	\$0
Computer Science	3	\$360,986	5	\$115,007
Computer Science/CEROC			2	\$105,879
CEROC			1	\$121,252
Electrical and Computer Engineering	0	\$0	2	\$174,681
Electrical and Computer Engineering/ Chemical Engineering/Mechanical Engineering	0	\$0	2	\$449,498
Electrical and Computer Engineering/ Chemical Engineering/Energy Center/Mechanical Engineering	1	\$500,000	0	\$0
Manufacturing and Engineering Technology	9	\$1,256,320	3	\$334,284
Manufacturing and Engineering Technology/Mechanical Engineering	1	\$209,333	0	\$0
Mechanical Engineering	25	\$5,824,831	14	\$1,093,729
<b>Total</b>	<b>45</b>	<b>\$12,913,084</b>	<b>33</b>	<b>\$3,974,840</b>

\*Amount awarded by agency during 2017-18. Does not represent actual expenditures on project.

## TABLE III continued

### Proposals Submitted and Awards Received Through Centers of Excellence and STEM Center by Academic Unit FY 2017-18 Water Center

Center/Academic Unit	Proposals Submitted		Awards Received*	
	<i># of Proposals</i>	<i>Amount Requested</i>	<i># of Awards</i>	<i>Amount Received</i>
Center	2	\$1,266,566	2	\$1,266,566
Agriculture	2	\$696,826	3	\$337,150
Biology	5	\$637,643	11	\$166,293
Biology/Civil and Environmental Engineering	1	\$31,508	1	\$31,508
Chemical Engineering	2	\$124,824	2	\$101,563
Chemistry/Curriculum and Instruction	0	\$0	1	\$479,644
Civil and Environmental Engineering	4	\$507,569	4	\$631,754
Cooperative Fisheries Research Unit	8	\$825,602	8	\$265,809
Graduate Studies/Chemical Engineering/Civil and Environmental Engineering	1	\$138,000	1	\$46,000
Environmental Studies	3	\$175,000	2	\$70,000
Environmental Studies/Biology	1	\$129,689	2	\$33,186
<b>Total</b>	<b>29</b>	<b>\$4,533,227</b>	<b>37</b>	<b>\$3,429,473</b>

\*Amount awarded by agency during 2017-18. Does not represent actual expenditures on project.

## TABLE III cont'd

### Proposals Submitted and Awards Received Through Centers of Excellence and STEM Center by Academic Unit FY 2017-18 STEM Center

Center/Academic Unit	Proposals Submitted		Awards Received*	
	<i># of Proposals</i>	<i>Amount Requested</i>	<i># of Awards</i>	<i>Amount Received</i>
Center	1	\$31,671	5	\$269,447
Center/Curriculum and Instruction	1	\$1,121,876	0	\$0
Mechanical Engineering	0	\$0	1	\$40,360
Physics/Curriculum and Instruction	1	\$1,370,314	0	\$0
<b>Total</b>	<b>3</b>	<b>\$2,523,861</b>	<b>6</b>	<b>\$374,819</b>

\*Amount awarded by agency during 2017-18. Does not represent actual expenditures on project.

## TABLE IV

### Proposals Submitted and Awards Received By Agency Classification FY 2017-18

University Unit	Proposals Submitted		Awards Received*	
	# of Proposals	Amount Requested	# of Awards	Amount Received
Federal	113	\$41,613,923	100	\$9,618,095
State	46	\$11,300,036	45	\$6,033,551
Private	26	\$1,325,605	24	\$650,244
Local	1	\$70,010	1	\$70,010
<b>Total</b>	<b>186</b>	<b>\$54,309,574</b>	<b>170</b>	<b>\$16,371,900</b>

\*Amount awarded by agency during 2017-18. Does not represent actual expenditures on project.

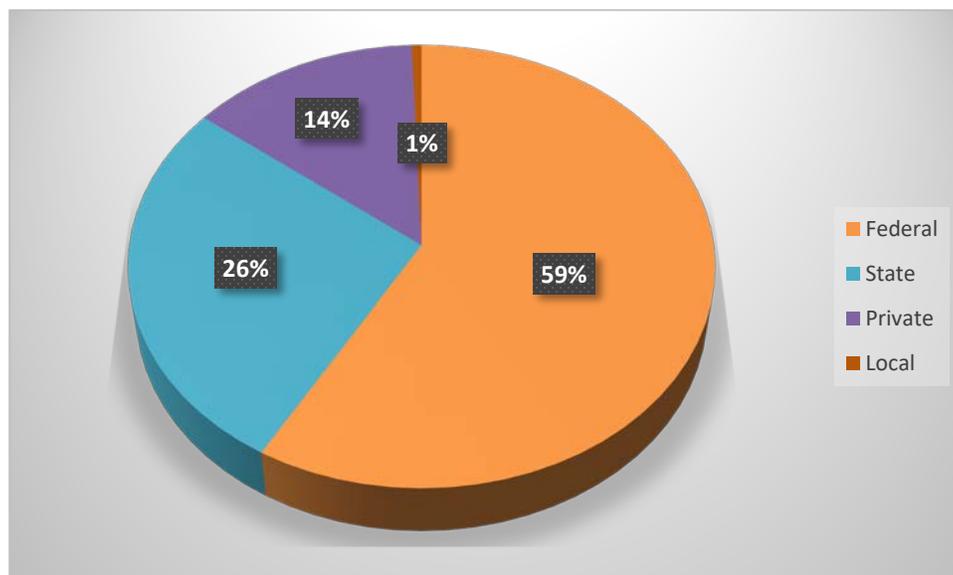


Figure 2  
Percentage Funding by Agency Classification

# TABLE V

## Federal Awards Received By Agency FY 2017-18

<b>Federal Awards</b>	<b>Amount Funded*</b>
AESF-Foundation	\$25,000
Air Force Office of Scientific Research	\$120,000
UT-Battelle, LLC (ORNL)	\$242,403
Economic Development Administration	\$118,000
Faraday Technology, Inc.	\$32,980
Luna Innovations	\$49,988
MIT Lincoln Laboratory	\$449,498
National Aeronautics and Space Agency	\$36,845
National Institutes of Health	\$135,554
National Institute of Standards and Technology	\$17,925
National Park Service	\$5,000
National Science Foundation	\$2,139,225
National Security Agency	\$123,245
Oak Ridge National Laboratory	\$115,007
Purdue University (NSF)	\$12,000
Robotic Technologies of Tennessee (Advanced Technology International)	\$24,503
Substance Abuse and Mental Health Services Administration	\$88,311
Tennessee Department of Agriculture	\$20,000
Tennessee Department of Education	\$1,111,275
Tennessee Department of Safety and Homeland Security	\$1,175,075
Tennessee Higher Education Commission	\$148,425
Tennessee Highway Safety Office	\$698,093
Tennessee Small Business Development Center	\$214,140
Tennessee State University (NSF)	\$49,000
Tennessee Wildlife Resources Agency	\$260,689
The Nature Conservancy	\$9,186
U. S. Department of Agriculture	\$378,764
U. S. Department of Energy	\$1,043,440
U. S. Department of Justice	\$300,000
U. S. Fish and Wildlife Services	\$70,000
U. S. Geological Survey	\$48,459
University Auxiliary and Research Services Corporation (NSF)	\$80,182

## TABLE V cont'd

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### Federal Awards Received By Agency FY 2017-18

<b>Federal Awards</b>	<b>Amount Funded*</b>
University of Alabama (NASA)	\$2,000
University of Florida Transportation Institute	\$93,457
University of South Dakota (NSF)	\$39,267
University of Tennessee (USDOE and TDOT)	\$60,367
Vanderbilt University (NASA)	\$40,360
Virginia Tech University (U.S. Navy)	\$40,432
<b>Total</b>	<b>\$9,618,095</b>

\*Amount awarded by agency during 2017-18. Does not represent actual expenditures on project.

## TABLE VI

### Proposals Submitted and Awards Received By Activity FY 2017-18

\*Amount awarded by agency during 2017-18. Does not represent actual expenditures on project.

Activity	Proposals Submitted		Awards Received*	
	# of Proposals	Amount Requested	# of Awards	Amount Received
Research	129	\$35,891,198	110	\$10,366,042
Public Service	32	\$15,589,235	38	\$4,407,330
Instruction	11	\$503,222	11	\$1,042,921
Student Support/Scholarships	8	\$1,821,527	7	\$337,709
Operation/Capital Project	1	\$19,996	0	\$0
Academic Support	5	\$484,396	4	\$217,898
<b>Total</b>	<b>186</b>	<b>\$54,309,574</b>	<b>170</b>	<b>\$16,371,900</b>

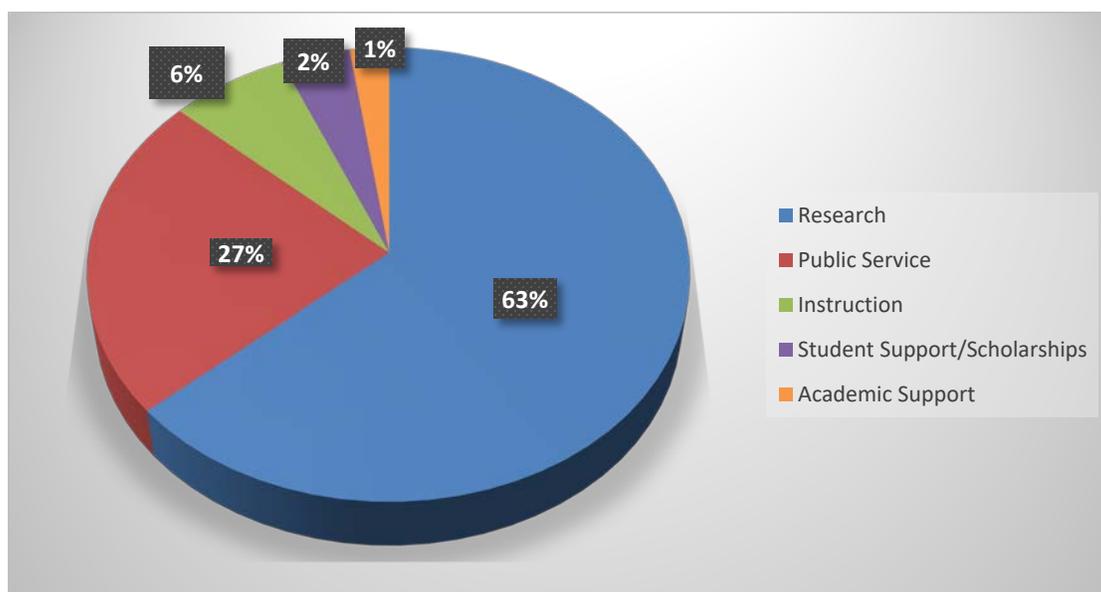


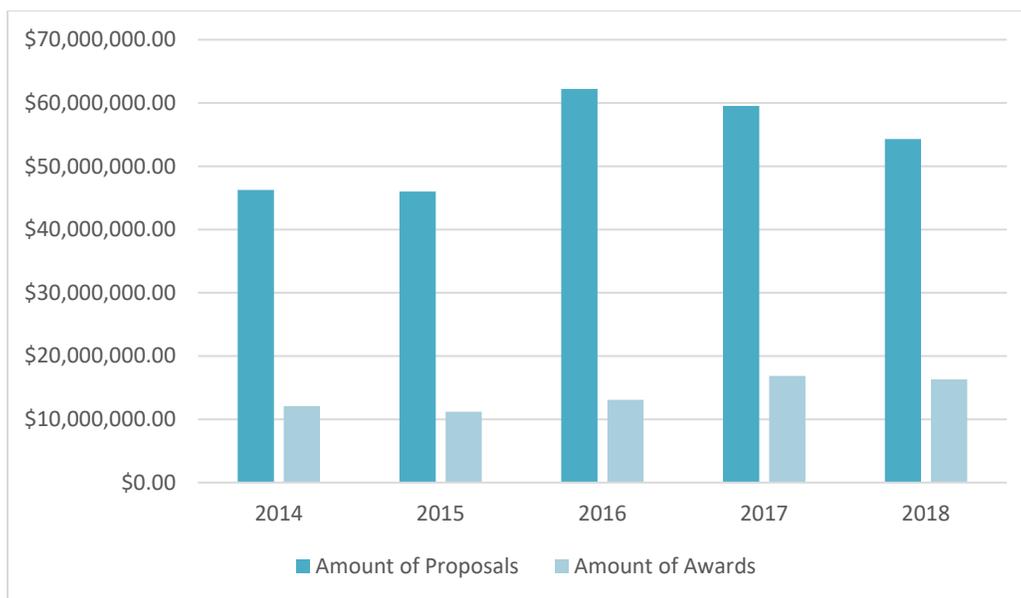
Figure 3  
Percentage Funding by Activity

# TABLE VII

## Proposals Submitted and Awards Received FY 2014-18

Fiscal Year	Proposals Submitted	Amount Requested	Awards Received	Amount Funded*
2014	153	\$46,245,166	129	\$12,074,067
2015	163	\$46,001,271	106	\$11,197,912
2016	219	\$62,221,204	137	\$13,088,361
2017	205	\$59,531,382	152	\$16,852,078
2018	186	\$54,309,574	170	\$16,371,900

\*Amount awarded by agency during 2017-18. Does not represent actual expenditures on project.



**Figure 4**  
**Number of Proposals vs. Awards, FY 2014-18**

# TABLE VIII

## Awards Received and Award Amounts By Classification FY 2014-18

Fiscal Year	Federal		State		Private		Local	
	No.	Award Amount*	No.	Award Amount*	No.	Award Amount*	No.	Award Amount*
2014	73	\$5,640,601	42	\$6,036,257	12	\$366,656	2	\$30,553
2015	71	\$5,427,437	24	\$5,451,722	11	\$318,753	0	\$0
2016	91	\$7,399,496	25	\$5,212,596	17	\$404,835	4	\$71,434
2017	88	\$8,251,230	43	\$8,088,879	20	\$505,352	1	\$6,617
2018	100	\$9,618,095	45	\$6,033,551	24	\$650,244	1	\$70,010

\*Amount awarded by agency during 2017-18. Does not represent actual expenditures on project.

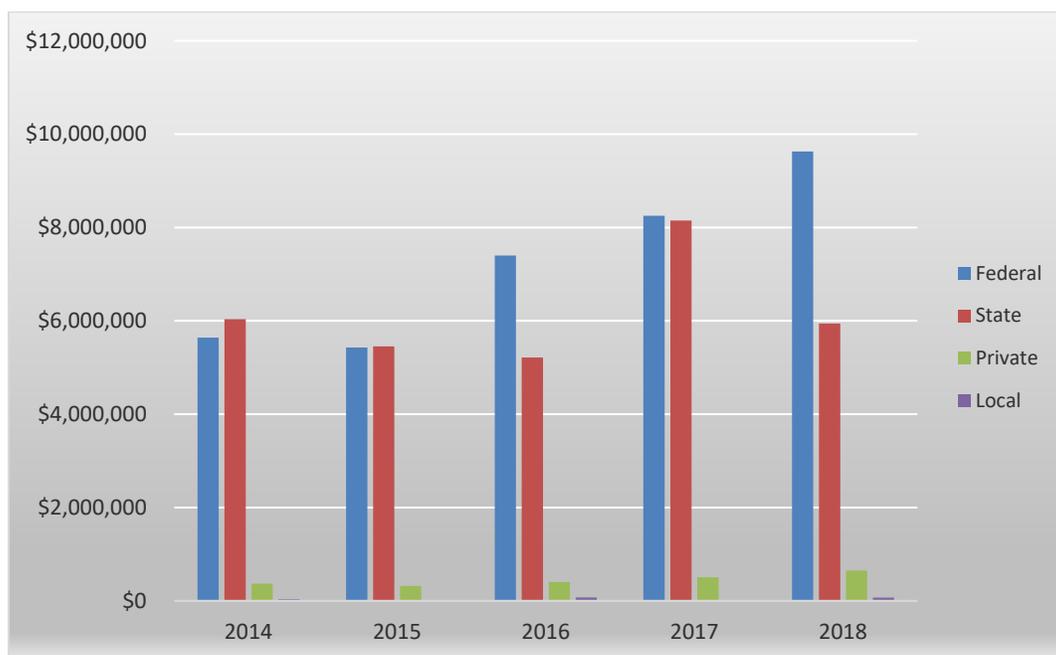


Figure 5  
Awards Received by Classification

# TABLE IX

## Awards Received and Award Amounts By Type of Activity FY 2014-18

Fiscal Year	Research		Public Service		Instruction		Academic Support		Capital Project		Fellowships/ Scholarships/ Student Services	
	No.	Award Amount*	No.	Award Amount*	No.	Award Amount*	No.	Award Amount*	No.	Award Amount*	No.	Award Amount*
2014	84	\$8,345,113	25	\$2,439,103	12	\$681,632	3	\$240,100	0	\$0	5	\$368,119
2015	60	\$6,943,175	28	\$2,587,904	8	\$906,837	4	\$200,728	0	\$0	6	\$559,268
2016	85	\$2,337,727	28	\$2,337,727	10	\$1,608,639	7	\$624,314	5	\$180,467	2	\$54,999
2017	95	\$9,395,792	33	\$3,501,542	8	\$1,192,717	4	\$209,147	3	\$2,137,847	9	\$415,033
2018	110	\$10,366,042	38	\$4,407,330	11	\$1,042,921	4	\$217,898	0	\$0	7	\$337,709

\*Amount awarded by agency during 2017-18. Does not represent actual expenditures on project.

# RESEARCH COMPLIANCE AND GENERAL COMPLIANCE SUPPORT

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## Research Compliance

The Office of Research is responsible for monitoring compliance with the federal policies that regulate research activities in the following areas: responsible conduct of research, research ethics, human subjects research, the humane care of laboratory animals used in research and experimentation, the management of conflicts of interest in research, research integrity, export laws, and other areas of oversight.

Ultimately, it is the responsibility of the individual investigators, with the assistance from the Office of Research, to comply with all applicable federal, state, and funding agency guidelines in implementing their grants and contracts.

## General Compliance Support

Several University Standing Committees, as well as other special committees, are regulated federally and must meet certain compliance criteria. These committees are, in general, research related and are associated with the Office of Research. The Associate Vice President serves as the Executive Officer for these committees, which include: the Institutional Animal Care and Use Committee, the Institutional Review Board for the Protection of Human Subjects, the Intellectual Property Advisory Committee, the Faculty Research Committee (the VP for Research and Economic Development serves as the Executive Officer of this committee), the Caplenor Faculty Research Award Committee, and the University Research Advisory Committee (the VP for Research and Economic Development serves as the Executive Officer of this committee). The Annual Report of each of these Committees is on file in the Office of Research.

# INSTITUTIONAL ANIMAL CARE AND USE COMMITTEE (IACUC)

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The Institutional Animal Care and Use Committee provides for and protects the welfare of laboratory animals used for research and pedagogy as set forth by the University and in accordance with the Public Health Service Act (PHS Act) mandated by the Health Research Extension Act of 1985, Public Law 99-158, and its amendments from the U.S. Department of Agriculture, 9 CFR 9, Parts 1-3. The committee membership includes faculty, administrators, a veterinarian, and a community representative. The Committee reports to the Administrative Council.

## ➤ **Committee Members**

- Dr. Chris Brown, Biology
- Ms. Sarah DeFurio, Environmental Health and Safety
- Dr. Bruce Greene, Agriculture
- Dr. Steve Hayslette, Biology (Chair)
- Dr. Tammy Howard, Nursing
- Dr. Chris Murray, Biology
- Dr. Jessica Owalt, College of Engineering
- Dr. Tyler Verble, Veterinarian
- Mr. Joe Weatherly, Ethicist
- Dr. Francis Otuonye, Executive Officer

## ➤ **Committee Actions**

- In accordance with national and institutional guidelines, laboratories inspections were conducted on September 22, 2017, and April, 2018.
- Applications Approved for the Use of Animals
  - ✓ Relative population densities, movements, and spawning success of Asian carp in the Tennessee and Cumberland Rivers (Dr. Mark Rogers-Biology, USGS Tennessee Cooperative Fishery Research Unit)
  - ✓ Range-wide population status assessment for the rare barrens darter, *Etheostoma forbesi* (Dr. Hayden Mattingly-Interdisciplinary Studies, Environmental Studies)
  - ✓ Impacts of *Didymosphenia geminate* mats on bottom-feeding fish diet and growth (Dr. Justin Murdock-Biology)

- ✓ Population genetics of the pygmy madtom, *Noturus Stanauli* (Dr. Carla Hurt-Biology)
- ✓ Spatial ecology and nesting ecology of the perenite (*Varanus giganteus*) (Dr. Chris Murray-Biology)
- ✓ Conservation genetics of *Ambystoma Barbouri* in Tennessee (Dr. Carla Hurt-Biology)
- ✓ Microbial assemblages across ecological scales in a crocodylian model system (Dr. Chris Murray-Biology)
- ✓ Visual elastomer implant tag retention in benthic riverine fishes (Dr. Keith Gibbs-Biology)
- ✓ This is nuts: Training shelter dogs to detect peanut allergens (Dr. Nikki Panter-Biology)
- A proposal to amend a previously approved project (Critical thermal capacity of dispersal: comparative niche breadth among populations of Mediterranean geckos (Dr. Chris Murray-Biology)) was approved by the committee.
- Use of the Collaborative Institutional Training Initiative (CITI) IACUC modules was implemented during fall of 2017.

➤ **Committee Dates**

- September 14, 2017; March 15, 2018

# INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS

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The Tennessee Tech University Institutional Review Board for the Protection of Human Subjects, or IRB, is a University Standing Committee operating through the Office of Research and Economic Development and reporting to the Administrative Council. In accordance with 45CFR46, the IRB is registered with the U.S. Department of Health and Human Services (DHHS). It is responsible for reviewing, approving, and providing oversight for research conducted by TTU students, staff, and faculty. The IRB develops and recommends policy to the University, in synchronization with federal regulations, on matters pertaining to the welfare of human subjects used in research, and implements those policies when approved. The main task of the IRB is to review research proposals involving human subjects, assess potential risks to those subjects, and ensure compliance with federal and TTU regulations regarding the protection of human subjects. Risks may involve physical, psychological, social, economic, or legal consequences, as well as violations of privacy and confidentiality.

## ➤ **Committee Members**

- Dr. Steven Seiler, Sociology and Political Science (Chair)
- Dr. Meral Anitsal, Economics and Marketing
- Dr. Megan Atkinson, Library Archives
- Dr. Chris Burgin, Counseling and Psychology
- Mr. Michael Clark, Community Representative
- Dr. Jann Cupp, Counseling and Psychology
- Dr. Paula Engelhardt, Physics
- Dr. Paula Greathouse, Curriculum and Instruction
- Dr. Terry Guo, Center for Manufacturing Research
- Dr. Seth King, Curriculum and Instruction
- Ms. Patricia McGee, Community Representative
- Dr. Susan Piras, Nursing
- Mr. James Rogers, Community Representative
- Dr. Francis Otuonye, Executive Officer

## ➤ **Committee Actions**

- The IRB Committee processed 122 applications during the 2017-18 year. Of those, 107 were approved for Exempt Status, and 15 were reviewed through Expedited Review.

- Nine of the Expedited applications were approved; four were returned to the investigator to revise and resubmit; one was approved conditionally upon the investigator's correcting minor changes; and one is still under review.
- Nine continuation/change applications were reviewed and approved, and two separate applications were approved through TTU's multi-institutional research policy.
- The new single-form IRB application was fully implemented on August 1, 2017.
- In November of 2017, the IRB Policies and Procedures were revised to comply with the revised Federal Policy for the Protection of Human Subjects (i.e., Common Rule). The implementation date set by DHHS was originally January 19, 2018, but has since been pushed back to July 19, 2018.

➤ **Committee Dates**

- September 11, 2017; November 6, 2017; January 22, 2018; and April 2, 2018

# INTELLECTUAL PROPERTY ADVISORY COMMITTEE

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Tennessee Tech University acknowledges that the faculty and staff may from time to time conceive of an idea or discover a process that could lead to the development of a patent or the production of copyrightable materials. The University encourages such activities by the faculty and staff and recognizes its responsibility to see that ideas and discoveries are administered for the best interest of all parties concerned, including the public. The University has established an Intellectual Property Advisory Committee for the purpose of advising the President on all matters involving patents and copyrights. Membership is composed of faculty and staff experienced in research, innovation, and the production of copyrightable materials. A majority of the membership is from the faculty.

## ➤ **Committee Members**

- Dr. Michael Allen, Mathematics (Chair)
- Dr. Sean Alley, Economics, Finance and Marketing
- Dr. Ali Alouani, Electrical and Computer Engineering
- Dr. Michael Best, Agriculture
- Ms. Brenna Edgemon, Student
- Dr. Sherrie Foster, Counseling and Psychology
- Dr. Steve Frye, Interdisciplinary Studies
- Ms. Sharon Holderman, Library
- Dr. Emily Lee, Nursing
- Mr. Mark Lynam, Administrative
- Ms. Ann Manginelli, Library
- Mr. Justin Medley, Student
- Dr. Manuel Villalba, Foreign Languages
- Dr. Francis Otuonye, Executive Officer

## ➤ **Committee Actions**

- Appendix B lists the intellectual property activity for 2017-18.
- The Committee revised the Intellectual Property Policy to address (a) ownership of thesis, dissertation, and course materials; and (b) the appropriate individual to review this policy.
- The Committee explored an opportunity for UT Knoxville to provide assistance to Tennessee Tech in technology transfer.

- Mr. Tim Bates, a Mechanical Engineering alumnus, was added as a community member to the Intellectual Property Advisory Committee.
- Method and apparatus for noninvasive mechanical-based assessment of heart performance by Hamidreza Bahraseman was released to Ehsan Languri.

➤ **Committee Dates**

- September 5, 2017; October 3, 2017; November 14, 2017; February 20, 2018

# FACULTY RESEARCH COMMITTEE

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The Faculty Research Program was established in the fall quarter of 1963 to: (1) stimulate interest in research on the part of the faculty; (2) provide institutional assistance to faculty members who wish to undertake research projects; and (3) assist in the dissemination of information developed in faculty research projects. The research program provides support for investigations of new research areas for the faculty members involved. The results of such support are expected to be publications or other dissemination of results and, where appropriate, proposals for external funding. It is anticipated that the results of faculty research will filter downward into the classroom, particularly to graduate courses. The Faculty Research Program is coordinated by the Faculty Research Committee. This committee consists of 10 faculty members with the Vice President of Research and Economic Development serving as Executive Officer.

## ➤ **Committee Members**

- Dr. Curtis Armstrong, Decision Sciences and Management
- Dr. Joseph Biernacki, Chemical Engineering
- Dr. Brad Cook, Biology
- Dr. Allen Driggers, History
- Dr. William Eberle, Computer Science
- Dr. Steven Frye, Interdisciplinary Studies
- Dr. Catherine Godes, Music
- Dr. Rachel Hall, Nursing
- Dr. Seth King, Curriculum and Instruction
- Dr. Melinda Swafford, Human Ecology (Chair)
- Dr. Bharat Soni, Executive Officer

## ➤ **Committee Actions**

- A complete listing of the Faculty Research Awards for 2017-18 is provided in Appendix C.
- The Committee held two proposal development workshops on November 16, 2017.

## ➤ **Committee Dates**

- October 5, 2017; February 8, 2018; March 15, 2018

# CAPLENOR FACULTY RESEARCH AWARD COMMITTEE

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The Caplenor Faculty Research Award, established in 1984 in honor of the late Dr. Charles Donald Caplenor, former Associate Vice President for Research and Dean of Instructional Development, is awarded annually to one member of the faculty of Tennessee Tech University for outstanding research accomplished while employed at the University.

➤ **Committee Members**

- Dr. Deborah Barnard, Foreign Languages
- Dr. Michael Birdwell, History (Chair)
- Dr. Greg Danner, Music
- Dr. Dennis Duncan, Agriculture
- Dr. Melissa Geist, Nursing
- Dr. Tor Guimaraes, Decision Sciences and Management
- Dr. Joseph Ojo, Electrical Engineering
- Dr. Steven Sharp, Environmental Sciences
- Dr. Sandi J. W. Smith, Curriculum and Instruction
- Dr. Francis Otuonye, Executive Officer

➤ **Committee Actions**

- The Caplenor Faculty Research Award was awarded to Dr. Joseph Biernacki for the 2017-18 fiscal year.

➤ **Committee Dates**

- October 30, 2017; March 13, 2018

# UNIVERSITY RESEARCH ADVISORY COMMITTEE

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The University Research Advisory Committee (URAC) advises the President and Provost on strategies to stimulate growth in research and externally funded scholarly activities within the University community and on the development of a comprehensive structure and network of activities to foster externally funded scholarly activities. The Committee reports directly to either the Academic Council or Administrative Council or both, depending on the matter at hand. In carrying out its function, the Committee will:

- A. Identify strengths, weaknesses, opportunities and challenges to research growth and externally funded scholarly activities at TTU.
- B. Identify emerging research opportunities anticipated across the academic discipline.
- C. Make recommendations regarding intellectual and infrastructure needs required to capitalize on major research opportunities.
- D. Develop plans and make recommendations for accessing, supporting and sustaining existing and emerging research thrust areas.
- E. Review current practices in research administration and recommend strategies to foster research growth.
- F. Make recommendations regarding the commercialization of research and intellectual property issues.

➤ **Committee Members**

- Dr. Michael Adduci, Music
- Dr. Steven Anton, Mechanical Engineering
- Dr. Debbie Barnard, Foreign Languages
- Dr. Jason Beach, Curriculum and Instruction
- Dr. Jeff Boles, Chemistry
- Ms. Alexia Dorris, Undergraduate Student
- Dr. Sheikh Ghafoor, Computer Science
- Dr. Adam Holley, Physics
- Dr. Shelia Hurley, Nursing
- Dr. Brian Leckie, Agriculture
- Dr. Satish Mahajan, Energy Center
- Dr. Hayden Mattingly, Environmental Studies
- Mr. Justin Medley, Graduate Student
- Dr. Ramachandran Natarajan, Business

- Dr. Terry Saltsman, President's Office
- Dr. Mark Stephens, Provost's Office
- Mr. Jeff Young, Business Office
- Dr. Bharat Soni, Executive Officer

➤ **Committee Actions**

- Due to the large number of new members to the committee, including a change in the chair, the current set of goals and objectives for research at TTU, which were generated by previous URAC committees, were distributed and reviewed. Items for review include: the status of the current action items from the Strategic Goals and Objectives document, new action items needed, how does research work in each department/college, and what are the differing needs. Committee goals and objectives were reviewed with President Oldham.
- A subcommittee was formed to provide recommendations on the development of new centers. Research was conducted regarding policies and procedures. A draft policy will be submitted to Dr. Soni for further action.
- A subcommittee was formed to review the change of faculty research grants and if the change has been successful in promoting the increase in scholarly activity of faculty in research pursuits, which is one of the URAC committee goals. Data is currently being reviewed and the subcommittee is communicating with the Faculty Research Grant Committee.
- The Annual Scholastic Research Award was amended from three awards to two (one tenured and one tenure-track) with the amount to each awardee increased by \$500. The total amount for each awardee is \$1,500. The awards will be presented to applicants in April of 2018. Five applications were received for the tenure-track award and three applicants for the tenured. One applicant was selected for each award.

➤ **Committee Dates**

- September 12, 2017; October 10, 2017; November 4, 2017; February 13, 2018; March 20, 2018; and April 10, 2018

# APPENDICES

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**Appendix A** gives the total amount of research funds brought into the University from external sources by college/area and departments/units within a given college. The faculty/administrators/staff responsible for each proposal, the funding agency, and the amount of funding received are listed for each.

**Appendix B** summarizes the intellectual property activity in the areas of patents and copyrights.

**Appendix C** summarizes the Faculty Research Committee Awards.

# Appendix A

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

<b>Administration</b>	<b>\$264,851</b>
<i>Counseling Center</i>	
<b>PI - Christina Mick</b>	
◆ #hopestrongeagles Substance Abuse and Mental Health Services Administration Amount: \$88,311.00	
<i>Graduate Studies</i>	
<b>PI – Alice Camuti</b>	
◆ Impact Education Attainment for Underrepresented Students: FastTrack BS to MS/MA Program Tennessee Board of Regents Amount: \$35,000.00	
<i>Facilities</i>	
<b>PI - DeLayne Miller</b>	
◆ Tennessee Technological University Education and Outreach Project Tennessee Department of Environment and Conservation Amount: \$35,922.00	
<i>Online and Distance Education</i>	
<b>PI – Kimberly Godwin</b>	
◆ Veteran Reconnect Grant Program Tennessee Higher Education Commission Amount: \$71,355.00	
<i>Minority Affairs</i>	
<b>PI - Robert Owens</b>	
◆ Expanding Diversity Offering Mentoring and Resources for First-Generation Students Tennessee Board of Regents Center: Energy Amount: \$34,263.00	

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

<b>Agriculture and Human Ecology</b>	<b>\$839,772</b>
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### *Administration*

#### **PI – Liz Mullens**

- ◆ Development of a New Poultry Science Program  
Tennessee Department of Agriculture  
Amount: \$85,000.00

### *Agriculture*

#### **PI – Dennis Fennewald**

- ◆ Urban Gardening Initiative  
Tennessee Department of Agriculture  
Amount: \$14,400.00

#### **PI - Brian Leckie**

- ◆ Building Research Capacity through the Characterization and Improvement of Insect-Resistant Tomatoes  
U. S. Department of Agriculture  
Center: Water  
Amount: \$300,000.00
- ◆ Prioritizing Fish Reintroduction in Lower Abrams Creek, GSMNP  
American Rivers / Tallassee Fund  
Center: Water  
Amount: \$17,150.00  
Co-PI – Carla Hurt, Joshua Perkin; Biology
- ◆ Evaluation of Bush-Type Heirloom Green Beans to Expand Markets for Tennessee Specialty Crops Growers  
Tennessee Department of Agriculture  
Center: Water  
Amount: \$20,000.00

#### **PI – O. P. McCubbins**

- ◆ Administrative Staff for Camp Clements FFA Leadership Training Center  
Tennessee Department of Education  
Amount: \$222,416.00

### *Human Ecology*

#### **PI - Melinda Anderson**

- ◆ Tennessee Early Childhood Training Alliance (TECTA)  
Tennessee State University  
Amount: \$180,806.00

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

<b>Arts and Sciences</b>	<b>\$1,786,272</b>
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### *Biology*

#### **PI - Brian Carver**

- ◆ Ecological and Climatic Assessment of Flying Squirrels in East Tennessee  
Tennessee Wildlife Resources Agency  
Center: Water  
Amount: \$38,000.00

#### **PI - W. Keith Gibbs**

- ◆ Assessment of Benthic Macroinvertebrate Response to Antimycis during Brook Trout Restoration in Little Cataloochee Creek  
Great Smoky Mountains National Park Service  
Center: Water  
Amount: \$5,000.00  
Co-PI - Justin Murdock; Biology

#### **PI – Steven Hayslette**

- ◆ Avian Occurrence and Habitat Use at Naval Support Activity Mid-South  
U. S. Geological Survey  
Center: Water  
Amount: \$48,459.00  
Co-PI - Daniel Combs; Biology
- ◆ Collection of Biological Data at Deer Check Stations  
Tennessee Wildlife Resources Agency  
Center: Water  
Amount: \$2,000.00

#### **PI – Carla Hurt**

- ◆ Genomic Variation and Species Diversification in Alpheid Snapping Shrimps  
National Geographic Committee for Research and Exploration  
Center: Water  
Amount: \$20,000.00
- ◆ Conservation Genomics and Population Status of Streamside Salamanders (*Ambystoma Barbouri*)  
Tennessee Wildlife Resources Agency  
Center: Water  
Amount: \$5,834.00

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

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### *Biology cont'd*

#### **PI – Carla Hurt**

- ◆ Molecular and Morphological Taxonomy of the Valley Flame Crayfish, *Cambarus deweesae*  
Tennessee Wildlife Resources Agency  
Center: Water  
Amount: \$4,000.00

#### **PI - Justin Murdock**

- ◆ Investigating Factors that Influence Hypoxia and Denitrification in Aquatic Agroecosystems  
U. S. Department of Agriculture  
Center: Water  
Amount: \$10,000.00
- ◆ Determining the Current Distribution and Potential Spread of *Didymo* in North Carolina Streams  
North Carolina Community Foundation  
Center: Water  
Amount: \$31,508.00  
Co-PI - Alfred Kalyanapu; Civil and Environmental Engineering

#### **PI – Donald Walker**

- ◆ The Probiotic Microbiome of Endangered Tennessee Bats: Implications for Biodiversity Conservation and Development of WNS Biocontrol Agents  
Tennessee Wildlife Resources Agency  
Center: Water  
Amount: \$30,000.00
- ◆ The Origin, Host and Geographic Range of Snake Fungal Disease with an Emphasis on Species of Greatest Conservation Need in Tennessee  
Tennessee Wildlife Resources Agency  
Center: Water  
Amount: \$3,000.00

### *Chemistry*

#### **PI - Jeffrey Boles**

- ◆ Project Inspire  
National Science Foundation  
Center: Water  
Amount: \$479,644.00  
Co-PI – Jeremy Wendt; Curriculum and Instruction

# Appendix A cont'd

## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

### *Chemistry cont'd*

#### **PI – Jesse Carrick**

- ◆ Modular Approaches to "Click" Complexants for Chemoselective Minor Actinide Separations  
U. S. Department of Energy  
Amount: \$251,258.00  
Co-PI - Cory Hawkins; Chemistry

#### **PI - Tao Yu**

- ◆ Travel to Oak Ridge National Laboratory  
Oak Ridge National Laboratory  
Amount: \$800.00

### *Cooperative Fisheries Research Unit*

#### **PI – Mark Rogers**

- ◆ TWRA Base Funds  
Tennessee Wildlife Resources Agency  
Amount: \$30,000.00  
Co-PI - Phillip Bettoli; Cooperative Fisheries Research Unit
- ◆ Evaluating Stocked Fisheries  
Tennessee Wildlife Resources Agency  
Center: Water  
Amount: \$106,000.00
- ◆ Relative Population Densities, Movement and Spawning Success of Asian Carp  
Tennessee Wildlife Resources Agency  
Center: Water  
Amount: \$62,760.00  
Co-PI - Phillip Bettoli; Cooperative Fisheries Research Unit

#### **PI - Amanda Rosenberger**

- ◆ A Spatial Assessment of the Status and Risk to Mussel Concentrations in the Meramec Drainage  
Missouri Department of Conservation  
Center: Water  
Amount: \$31,484.00
- ◆ A Water Quality Profile of the Little Black River System to Determine Potential Causes for Decline and To Identify Potential Sites for Mitigation and Reintroduction  
Missouri Department of Conservation  
Center: Water  
Amount: \$22,220.00

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

### *Cooperative Fisheries Research Unit cont'd*

#### **PI - Amanda Rosenberger**

- ◆ Determination of Geomorphological and Landscape Factors Contributing to Diverse Unionoid Mussel Communities in Missouri River Systems  
The Curators of the University of Missouri  
Center: Water  
Amount: \$23,250.00
- ◆ Intern for Propagation of Freshwater Mussels and Fishes in Tennessee  
Tennessee Wildlife Resources Agency  
Center: Water  
Amount: \$20,095.00

### *Earth Sciences*

#### **PI - Lauren Michel**

- ◆ Paleoenvironmental Reconstruction of Early Miocene Kiahara Formation, Rusinga Island  
Leakey Foundation  
Amount: \$24,949.00

#### **PI – Jeannette Wolak**

- ◆ Geologic Mapping and Stratigraphic Analyses of Terraced Fan Deposits  
NASA  
Amount: \$36,845.00
- ◆ Mixed Carbonate-Siliciclastic Sediment Gravity Flows: Depositional Processes in the Mississippian  
American Chemical Society  
Amount: \$25,500.00

### *Physics*

#### **PI – Sakir Ayik**

- ◆ Studies of Heavy-Ion Collisions in Stochastic Mean-Field Approach  
U. S. Department of Energy  
Amount: \$40,000.00

#### **PI - Adam Holley**

- ◆ Investigation of Spin Evolution in Magnetic Ultracold Neutron Bottles Used to Measure the Free Neutron Lifetime  
National Science Foundation  
Amount: \$95,000.00

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

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### *Physics cont'd*

#### **PI – Mary Kidd**

- ◆ Investigation of Neutron-Induced Backgrounds on  $^{134,136}\text{Xe}$  for Large-Scale Neutrinoless Double Beta Decay  
National Science Foundation  
Amount: \$39,850.00
- ◆ PIRE: A Global Collaboration for Advanced Germanium Detectors and Technology  
University of South Dakota  
Amount: \$39,267.00

#### **PI – Raymond Kozub**

- ◆ Nuclear Physics with Radioactive Ion Beams  
U. S. Department of Energy  
Amount: \$80,000.00

#### **PI – Mustafa Rajabali**

- ◆ New High-Resolution Neutron Detector for the Studies of Exotic Nuclei-NEXT  
University of Tennessee  
Center: Energy  
Amount: \$53,367.00
- ◆ The Structure of Neutron-Rich Deformed Nuclei Studied via Beta Decay  
Department of Energy  
Center: Energy  
Amount: \$46,000.00

#### **PI - Stephen Robinson**

- ◆ A Model of Education Transformation: Developing a Community Implementing NGSS  
University Auxiliary and Research Services Corporation  
Amount: \$80,182.00  
Co-PI - Paula Engelhardt; Physics

# Appendix A cont'd

## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

<b>Business</b>	<b>\$2,723,674</b>
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### *Business Media Center*

#### **PI - Kevin Liska**

- ◆ Fitzgerald Collision Repair Marketing Management  
Fitzgerald Collision Repair  
Amount: \$125,594.00
- ◆ Perkins IV-2017  
Tennessee Board of Regents  
Amount: \$4,000.00
- ◆ Ollie Otter, Booster Seat and Seat Belt Education  
Tennessee Highway Safety Office  
Amount: \$166,593.00  
Co-PI - Julie Brewer; Business Media Center
- ◆ Tennessee Traffic Safety Resource Service  
Tennessee Highway Safety Office  
Amount: \$531,500.00
- ◆ Work Zone Traffic Control Safety  
Tennessee Department of Transportation  
Amount: \$10,000.00
- ◆ Respite Care Marketing and Virtual Reality  
Tennessee Respite Coalition  
Amount: \$90,000.00  
Co-PI - Mike Gotcher; Interdisciplinary Studies; Administration
- ◆ Tennessee Health-Smoking Education, Virtual Reality Simulation Services  
Tennessee Department of Health  
Amount: \$75,000.00
- ◆ TN Health-ENDS-Electronic Nicotine Delivery Systems, Virtual Reality Simulation Services  
Tennessee Department of Health  
Amount: \$75,000.00
- ◆ Perkins IV-2018  
Tennessee Board of Regents  
Amount: \$20,000.00
- ◆ Reduce Teen Crashes-California Statewide Campaign  
SADD, Inc.  
Amount: \$70,000.00
- ◆ Integrated Marketing Communications System  
Tennessee Department of Safety and Homeland Security  
Amount: \$1,175,075.00
- ◆ Blended Learning Module Services  
Tennessee Department of Transportation  
Amount: \$75,000.00

# Appendix A cont'd

## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

### *Decision Sciences and Management*

**PI - Susan Wells**

- ◆ 2018 Governor's School for Innovation and Entrepreneurship  
Tennessee Department of Education  
Amount: \$91,772.00

### *Small Business Development Center*

**PI - Jennifer Dangelo**

- ◆ TSBDC-TTU/Online Center  
Tennessee Small Business Development Center  
Amount: \$214,140.00  
Co-PI - John Woodard; SBDC

## Education

**\$1,377,521**

### *Education Administration*

**PI – Julie Baker**

- ◆ Leaving the Lecture Behind: Teaching Critical Thinking Skills and Student Engagement through Contemporary Issues  
Tennessee Higher Education Commission  
Amount: \$74,833.00  
Co-PI – Allen Driggers; History, Mike Gotcher; Interdisciplinary Studies, and Ginger Thomas; Exceptional Learning
- ◆ Assessing Initiatives to Improve Student Teaching  
The Gates Foundation to the American Institutes for Research  
Amount: \$31,250.00

### *Curriculum and Instruction*

**PI – Melissa Comer**

- ◆ The Sleeping Giant Awakens, Secrets of the Manhattan Project Revealed  
Tennessee Higher Education Commission  
Amount: \$73,592.00  
Co-PI - James Martin; Curriculum and Instruction

**PI – Paula Greathouse**

- ◆ Discovering what is, rather than what is not: Preparing Pre-Service Teachers to Challenge Oppression Through YA Learning  
ALAN Foundation  
Amount: \$1,377.00

# Appendix A cont'd

## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

### *Curriculum and Instruction cont'd*

#### **PI - Martha Howard**

- ◆ Bridges Early Intervention Resource Agency Assessment Vendor  
Tennessee Department of Education  
Amount: \$259,880.00
- ◆ Healthy Start for Upper Cumberland Families and Young Children  
Stephen's Center  
Amount: \$8,175.00
- ◆ Tennessee Early Childhood Preschool Program  
Putnam County Schools  
Amount: \$86,532.00
- ◆ Tennessee Technological University - Bridges Program  
Tennessee Department of Education  
Amount: \$534,000.00
- ◆ Tennessee's Early Intervention System Eligibility Evaluation Grant Contract-Middle TN Cost Proposal B  
Tennessee Department of Education  
Amount: \$233,334.00  
Co-PI - Amy Callender; Curriculum and Instruction

#### **PI – Janet Isbell**

- ◆ It's a Working Life: Building Knowledge of Social Studies Practices for Accessing and Critically Examining Primary and Secondary Sources  
Tennessee Higher Education Commission  
Amount: \$74,548.00  
Co-PI - Amber Spears; Curriculum and Instruction

<b>Engineering</b>	<b>\$6,724,400</b>
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### *Basic Engineering*

#### **PI – Kristine Craven**

- ◆ First Lego League Tournament  
FIRST  
Amount: \$2,500.00

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

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### *Chemical Engineering*

#### **PI - Joseph Biernacki**

- ◆ Collaborative Research: 3D Printing of Civil Infrastructure Materials with Controlled Microstructural Architectures  
National Science Foundation  
Center: Energy  
Amount: \$64,289.00

#### **PI - Laura Chavez**

- ◆ Reclaiming Valuable Resources from Industrial Wastewater  
National Science Foundation  
Center: Water  
Amount: \$90,738.00
- ◆ Nuclear Hybrid Energy Systems: Desalination Case Study  
UT-Battelle, LLC  
Center: Energy  
Amount: \$23,676.00

#### **PI - Robby Sanders**

- ◆ Idea to Commercially-Viable Healthcare Solutions: Enhancement and Expansion of Clinical Immersion at Disciplinary Interfaces Course  
Venturewell  
Center: Manufacturing  
Amount: \$5,000.00  
Co-PI - Melissa Geist; Nursing

#### **PI - Liqun Zhang**

- ◆ Investigation on the Structure of Human Beta Defensin Type 3 in Lipids  
Burroughs Wellcome Fund  
Center: Water  
Amount: \$10,825.00

### *Civil and Environmental Engineering*

#### **PI - Daniel Badoe**

- ◆ Development of Tennessee Travel Demand Model User's Group  
University of Tennessee-Knoxville  
Center: Energy  
Amount: \$7,000.00

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

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### *Civil and Environmental Engineering cont'd*

#### **PI - Steven Click**

- ◆ Regional Transportation Center on Reducing Congestion  
University of Florida Transportation Institute  
Center: Energy  
Amount: \$93,457.00

#### **PI – Craig Henderson**

- ◆ Comparing Strength and Modules of Elasticity Values for Prisms Constructed with Lightweight and Normal Weight Grout  
National Concrete Masonry Association Education and Research Foundation  
Center: Energy  
Amount: \$54,280.00  
Co-PI - Benjamin Mohr; Civil and Environmental Engineering

#### **PI - Alfred Kalyanapu**

- ◆ Proof-of-Concept GIS-based Vegetated Swale Algorithm for TDOT Highways (GV-SwATH)  
ENSAFE  
Center: Water  
Amount: \$185,193.00

#### **PI - Daniel VandenBerge**

- ◆ Rapid Distributed Sensing of Subsurface In-situ Stress  
Luna Innovations  
Center: Energy  
Amount: \$49,988.00
- ◆ Update and Revisions to UFC 3-220-10N Soil Mechanics (DM7-01)  
Virginia Tech University  
Center: Energy  
Amount: \$40,432.00

### *Computer Science*

#### **PI – Gerald Gannod**

- ◆ Incorporating the Preferences for Everyday Living Inventory into Ohio's Nursing Homes to Improve Resident Care  
Miami University  
Center: Energy  
Amount: \$60,205.00

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

### *Computer Science cont'd*

#### **PI - Sheikh Ghafoor**

- ◆ Detection and Analysis of Malware in Critical Infrastructure  
Oak Ridge National Laboratory  
Center: Manufacturing  
Amount: \$85,026.00
- ◆ Cyber Training: CDL: IPDC- Summer Institute for Integrating Parallel and Distributed Computing in Introductory Programming Classes  
National Science Foundation  
Center: Energy  
Amount: \$143,215.00  
Co-PI - Michael Rogers; Computer Science

#### **PI – Mohammad Rahman**

- ◆ CRII: CPS: Noninvasive Security Analysis for Smart Grid Energy Management Systems  
National Science Foundation  
Center: Energy  
Amount: \$88,479.00

#### **PI - Ambareen Siraj**

- ◆ GenCyber Camp at Tennessee Technological University-Summer 2018  
National Security Agency  
Center: Manufacturing  
Amount: \$123,245.00
- ◆ Tennessee Tech's Participation in Addressing RESEARCH PROBLEMS IN NATIONAL INFORMATION SECURITY through the INSuRE Project  
Purdue University  
Center: Manufacturing  
Amount: \$12,000.00
- ◆ Supplement to Tennessee Cybercorps: A Hybrid Program in Cybersecurity-Community College Inclusion  
National Science Foundation  
Center: Manufacturing  
Amount: \$121,252.00
- ◆ Supplement: Tennessee Cybercorps: A Hybrid Program in Cybersecurity  
National Science Foundation  
Center: Manufacturing  
Amount: \$105,879.00  
Co-PI - Mohammad Rahman; Computer Science

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

### *Computer Science cont'd*

#### **PI - Douglas Talbert**

- ◆ Evaluating the Mutual Benefits of Deep Learning and Never-Ending Learning to Support Cancer Surveillance and Precision Oncology  
Oak Ridge National Laboratory  
Center: Manufacturing  
Amount: \$29,981.00

### *Electrical and Computer Engineering*

#### **PI – Indranil Bhattacharya**

- ◆ Immersive Research in Energy Generation, Storage/Conversion, and Power Transmission  
National Science Foundation  
Center: Energy  
Amount: \$107,080.00  
Co-PI - Joseph Biernacki; Chemical Engineering

#### **PI – Indranil Bhattacharya**

- ◆ Investigating Optical Characteristics, Doping Levels and Current Matching in Perovskite/Si, Perovskite/GaAs/Si and Perovskite/III-V Ternary Semiconductors  
National Science Foundation  
Center: Energy  
Amount: \$30,047.00

#### **PI - Wayne Johnson**

- ◆ Advancement of Cryogenic Electronics  
MIT Lincoln Laboratory  
Center: Manufacturing  
Amount: \$449,498.00  
Co-PI(s) – Satish Mahajan; Energy Center, Holly Stretz; Chemical Engineering, and Christopher Wilson, Mechanical Engineering

#### **PI - Mohamed Mahmoud**

- ◆ Efficient Energy Management System with Integrated Cybersecurity Measures in Qatar's Smart Grid  
Texas A&M University  
Center: Energy  
Amount: \$29,988.00  
Co-PI - Omar Elkeelany; Electrical and Computer Engineering
- ◆ Hybrid AC/DC Islanded Micro-grids in Qatar: Planning, Operation, and Cyber Security  
Texas A&M University  
Center: Energy  
Amount: \$28,661.00

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

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### *Electrical and Computer Engineering cont'd*

- ◆ Towards Privacy Preserving Autonomous Vehicle Services  
National Science Foundation  
Center: Manufacturing  
Amount: \$53,578.00
- ◆ Multi-Layer Approaches for Securing Enhanced AMI Networks against Traffic  
Analysis Attacks  
National Science Foundation  
Center: Energy  
Amount: \$130,176.00  
Co-PI - Robert Qiu; Manufacturing Center
- ◆ Security and Privacy-Preserving Cyber Physical Systems  
National Science Foundation  
Center: Manufacturing  
Amount: \$121,103.00  
Co-PI - Syed Rafay Hasan; Electrical and Computer Engineering

### *Energy Center*

#### **PI – Satish Mahajan**

- ◆ Center for Energy Systems Research  
Tennessee Higher Education Commission  
Center: Energy  
Amount: \$916,600.00
- ◆ Energy Center Power-Test-Service Account  
Various  
Center: Energy  
Amount: \$2,090.00  
Co-PI - L. K. Crouch; Civil and Environmental Engineering
- ◆ Solar Power Conversion on the Upper Cumberland  
U. S. Department of Agriculture  
Center: Energy  
Amount: \$68,764.00

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

### *Manufacturing Center*

#### **PI - Vahid Motevalli**

- ◆ Center for Manufacturing Research State Appropriation  
Tennessee Higher Education Commission  
Center: Manufacturing  
Amount: \$1,505,500.00
- ◆ Manufacturing Center Testing and Design  
Various  
Center: Manufacturing  
Amount: \$70,010.00

### *Manufacturing and Engineering Technology*

#### **PI - Ahmed Elsayy**

- ◆ Welding Applications Development for High Mobility Manufacturing Robot  
Robotic Technologies of Tennessee (via Advanced Technology International)  
Center: Energy  
Amount: \$24,503.00

#### **PI - Ismail Fidan**

- ◆ AM-WATCH: Additive Manufacturing - Workforce Advancement Training Coalition and Hub  
National Science Foundation  
Center: Manufacturing  
Amount: \$310,759.00

#### **PI - Duckbong Kim**

- ◆ Summer Undergraduates Research Fellowship (SURF) Program-Gaithersburg  
National Institute of Standards and Technology  
Center: Manufacturing  
Amount: \$17,925.00
- ◆ Development and Stabilization/Advancement of Wire+Arc Additive Manufacturing (WAAM)  
Korea Institute of Industrial Technology  
Center: Manufacturing  
Amount: \$5,600.00

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

### *Mechanical Engineering*

#### **PI - Steven Anton**

- ◆ Continuous Real-Time State Monitoring in Highly Dynamic Environments  
Air Force Office of Scientific Research  
Center: Manufacturing  
Amount: \$120,000.00
- ◆ Self-Powered In Vivo Force and Implant Wear Sensing in Knee Anthroplasty  
National Institute of Health  
Center: Manufacturing  
Amount: \$135,554.00

#### **PI - Stephen Canfield**

- ◆ Prototype System for Validating Key Aspects of Electric Sail Deployment System  
University of Alabama  
Center: Manufacturing  
Amount: \$2,000.00

#### **PI - Pinggen Chen**

- ◆ Decoupling Observer Design for Nox Sensor in Selective Catalytic Reduction System Applications  
Cummins Technical Center  
Center: Manufacturing  
Amount: \$54,877.00

#### **PI - Corinne Darvennes**

- ◆ National Space Grant College and Fellowship Program (SPACE Grant)  
Vanderbilt University  
Center: STEM  
Amount: \$40,360.00

#### **PI - Glenn Cunningham**

- ◆ Public Private Partnership to Promote Efficient Manufacturing and Workforce Development  
Department of Energy  
Center: Manufacturing  
Amount: \$471,321.00  
Co-PI - Ehsan Languri; Mechanical Engineering

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

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### *Mechanical Engineering cont'd*

#### **PI – Darrell Hoy**

- ◆ Tennessee Louis Stokes Alliances for Minority Participation (TLSAMP)  
Tennessee State University  
Center: Energy  
Amount: \$49,000.00  
Co-PI(s) - Tony Marable; Engineering Minority Program and Elizabeth Powell; Student Success Center
- ◆ Board of Architectural and Engineering Examiners Grant  
Board of Architectural and Engineering Examiners  
Amount: \$37,092.00

#### **PI – Stephen Idem**

- ◆ Determine the Absolute Roughness of Phenolic Duct  
ASHRAE  
Center: Energy  
Amount: \$49,704.00

#### **PI – Ehsan Languri**

- ◆ Passive Wastewater Processing System (PawPros)  
National Science Foundation  
Center: Energy  
Amount: \$50,000.00

#### **PI - Chabum Lee**

- ◆ Collaborative Research: Improved Freeform Measurement through Fiber-based Metrology  
National Science Foundation  
Center: Manufacturing  
Amount: \$62,136.00
- ◆ Cutting Tool Health Monitoring Technique Utilizing Edge Diffraction  
National Instruments Academic Research Program  
Amount: \$2,000.00

#### **PI - Meenakshi Sundaram**

- ◆ UT-CIS Contract  
The University of Tennessee Center for Industrial Services  
Center: Manufacturing  
Amount: \$20,000.00
- ◆ UT-CIS Contract (CAPSTONE PROJECTS)  
The University of Tennessee Center for Industrial Services  
Center: Manufacturing  
Amount: \$15,000.00

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

### *Mechanical Engineering cont'd*

#### **PI - Christopher Wilson**

- ◆ Governor's School for Emerging Technologies  
Tennessee Department of Education  
Amount: \$133,973.00

#### **PI – Ying Zhang**

- ◆ Low Cost Corrosion and Oxidation Resistance Coatings for Improved System Reliability  
U. S. Department of Energy  
Center: Manufacturing  
Amount: \$32,980.00
- ◆ Electro-Codeposition of MCrAlY Coatings for Advanced Gas Turbine Applications  
U. S. Department of Energy  
Center: Manufacturing  
Amount: \$25,000.00

#### **PI - Jiahong Zhu**

- ◆ Development and Validation of Low-Cost, Highly-Durable, Spinel-Based Contact Materials for SOFC  
Cathode-Side Contact Application  
U. S. Department of Energy  
Center: Manufacturing  
Amount: \$154,861.00

### **Fine Arts**

**\$40,638**

### *Craft Center*

#### **PI – Gail Gentry**

- ◆ Focus on Fine Craft Program for High School and Middle School Students  
Tennessee Arts Commission  
Amount: \$7,000.00

### *Music*

#### **PI – Daniel Allcott**

- ◆ National String Project Site  
National String Project Consortium  
Amount: \$10,000.00  
Co-PI - Sarah McKelvie; Music

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

### Music cont'd

#### **PI - Colin Hill**

- ◆ SERS: Afro-Caribbean Ensemble  
Tennessee Board of Regents  
Amount: \$23,638.00  
Co-PI - Robert Owens; Minority Affairs

<b>Interdisciplinary Studies</b>	<b>\$103,186</b>
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### Environmental Studies

#### **PI - Hayden Mattingly**

- ◆ Rangewide Population Status Assessment for the Rare Barrens Darter, *Etheostoma forbesi*  
U. S. Fish and Wildlife Services  
Center: Water  
Amount: \$40,000.00  
Co-PI - John Johansen; Environmental Studies
- ◆ Development of a Fish Index of Biotic Integrity for West Tennessee  
The Nature Conservancy  
Center: Water  
Amount: \$9,186.00
- ◆ Environmental DNA Detection, Population Status, and Habitat Use of the Pygmy Madtom, *Noturus stanauli*  
Tennessee Wildlife Resources Agency  
Center: Water  
Amount: \$24,000.00  
Co-PI – Carla Hurt; Biology

#### **PI - Hayden Mattingly**

- ◆ Comparative Habitat Suitability Analysis for Reintroduction and Management of Bluemask Darter and Cumberland Pigtoe Populations in the Upper Caney Fork River Drainage  
U. S. Fish and Wildlife Service  
Center: Water  
Amount: \$30,000.00

# Appendix A cont'd

## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

<b>Nursing</b>	<b>\$300,000</b>
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### *Nursing*

#### **PI – Ann Hellman**

- ◆ Project AWAKEN  
U. S. Department of Justice  
Amount: \$300,000.00

<b>Research and Economic Development</b>	<b>\$2,211,586</b>
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### *Research and Economic Development*

#### **PI - Bharat Soni**

- ◆ University Center Economic Development Program Competition  
Economic Development Administration  
Amount: \$118,000.00  
Co-PI - Tom Brewer; Economic Development

### *STEM Center*

#### **PI – Scott Eddins**

- ◆ HUB Operations and Innovative Educator Workshops  
Battelle Education  
Center: STEM  
Amount: \$31,671.00

#### **PI – Sally Pardue**

- ◆ AEOP Battelle Consortium  
UT-Battelle  
Center: STEM  
Amount: \$218,727.00
- ◆ Upper Cumberland Rural STEM Initiative: Learning Communities for Manufacturing Careers  
UT-Battelle  
Center: Tennessee Department of Education  
Amount: \$84,061

# Appendix A cont'd

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## Externally Funded Projects by College/Department/Center Investigator(s), Project Title, Funding Agency and Funding Amount Listed

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### *Water Center*

#### **PI - Bharat Soni**

- ◆ Center for the Management, Utilization and Protection of Water Resources State Appropriation  
Tennessee Higher Education Commission  
Center: Water  
Amount: \$1,163,700.00
- ◆ Water Center Analytical and Computer Services  
Various  
Center: Water  
Amount: \$102,866.00

#### **PI - Tania Datta**

- ◆ Performance Evaluation of Existing Vegetated Swales for Stormwater Runoff Reduction from Tennessee  
Department of Transportation Highways  
ENSAFE  
Center: Water  
Amount: \$271,011.00  
Co-PI - Daniel VandenBerge; Civil and Environmental Engineering
- ◆ Tracking the Sources of Nitrogen Pollutants in TDOT MS4 Stormwater Discharges  
ENSAFE  
Center: Water  
Amount: \$170,000.00  
Co-PI - Alfred Kalyanapu; Civil and Environmental Engineering
- ◆ Solid Waste Management Improvement in Iraq by US-Iraq Higher Education Partnership: Case Study in  
Al-Muthanna Province  
IREX  
Center: Water  
Amount: \$5,550.00

#### **PI – Grace McClellan (graduate student)**

- ◆ Linking Diversity of Polyphosphate Accumulating Organisms to Improved Functional Stability of the  
Enhanced Biological Phosphorus Removal Process  
National Science Foundation Graduate Research Fellowship Program  
Center: Water  
Amount: \$46,000.00  
Co-PI – Tania Datta (Research Advisor); Civil and Environmental Engineering

# Appendix B

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## Intellectual Property Activity 2017-18

### Invention Disclosures

- An Apparatus and Method for Integrated Real Time Low-cost Load Disaggregation, Remote Monitoring, and Control by Alouani and England
- An Efficient Low-cost Adaptive Heterogeneous Time-multiplexed Sampling (HTMS) Technique for Data Acquisition Systems by Alouani and Elkeelany
- Universal Semi-automatic Flexible Robotic Arm for Minimally Invasive Surgeries by Alouani and Bhattarai
- Pipet Stabilization Attachment by Sanders, Sarah, Cain, Haris, and Lee
- In-Situ Stress Rock Fracture Sensing with High-Definition Fiber Optic Sensing Technology by VandenBerge, Ohanian, and Davis
- Fiber-Reinforced Additively Manufactured Snap-fit Connected Medical Boot by Imeri, Russell, Chen, Ortiz, Fidan, and Wendt
- A Method of Passive Distillation for Wastewater Treatment using Solar Energy by Languri, Jaladi, and Piras

### Provisional Patent Applications Filed

- Block-aide by Walker, Stockdale, Ripley, Cheatham, Pullen, West, and Zelenock
- An Apparatus and Method for Integrated Real Time Low-cost Load Disaggregation, Remote Monitoring, and Control by Alouani and England
- Fiber-Reinforced Additively Manufactured Snap-fit Connected Medical Boot by Imeri, Russell, Chen, Ortiz, Fidan, and Wendt

### Invention Disclosures Pending Committee Review

- Electrical Element Stacking for Alternating Charge Recycling by Van Neste
- Method for producing deoxygenated bio oil using biomass by Biernacki, Zolghadr, Van Neste, Murray
- Natural Ion Energy Harvesting by Mahajan
- Environment Friendly Strength Enhancing Admixtures for Portland Cement Concrete by Biernacki, Visco, Chaudhari
- Strength Enhancing Admixtures for Portland Cement Concrete by Biernacki, Visco, Chaudhari

# Appendix C

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## Faculty Research Committee Awards 2017-18

### Track I

Author(s)	Title	Dept.	Amt.	Type
Holly Anthony	High School Mathematics Teachers' Beliefs and Perceptions of Integrated Mathematics	Curriculum and Instruction	\$3,000	Track I
Laura Chavez	Introduction of Carbon Molecular Sieves into Polymeric Membranes for Enhanced Removal of Small Neutral Molecules from Drinking Water and Wastewater	Chemical Engineering	\$3,000	Track I
Joshua Hauser	Contributions: Original Compositions and Arrangements for Trombone	Music	\$2,995	Track I
Ahmed Kamal	Effect of Yoga Practicing on Autonomic Function Assessment of Alzheimer's Disease Patients Using Kernel Method and Entrainment Techniques	Manufacturing and Engineering Technology	\$3,000	Track I
Stephanie Kazanas	Creativity and Cognition: Investigating the Role of Divergent Thinking in Adaptive Memory	Counseling and Psychology	\$3,000	Track I
Mark Loftis	The Relationship Between Adverse Childhood Experiences, Alexithymia and Suicide Risk in College Students	Counseling and Psychology	\$3,000	Track I
Chad Luke	Ethical Considerations for Counselors Integrating Neuroscience into Clinical Practice and Training	Counseling and Psychology	\$3,000	Track I
Tony Michael	State vs. Trait: The Relationship Between Early Childhood Parental Attachment and Suicide-Related Thoughts and Behaviors in College Students	Counseling and Psychology	\$3,000	Track I
Alexander Shibakov	Stochastic Learning and Artificial Intelligence	Mathematics	\$3,000	Track I
			<b>\$26,995</b>	

# Appendix C cont'd

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## Faculty Research Committee Awards 2017-18

### Track II

Author(s)	Title	Dept.	Amt.	Type
Indranil Bhattacharya	Improving Energy Density through Synthesis, Characterization and Investigation of Diffusion Mechanisms in Layered Structure Sodium Ion Batteries	Electrical and Computer Engineering	\$10,000	Track II
David Gallop and Jeremy Blair	VRAE Virtual Reality Arts Education	Art	\$9,998	Track II
Seth King	Project VIBE: Immersive Virtual Instruction in Behavioral Education	Curriculum and Instruction	\$10,000	Track II
Mohamed Mahmoud	Towards Secure and Private-Preserving Intelligent Traffic Management Systems	Electrical and Computer Engineering	\$10,000	Track II
Keith Morris	The Development of Soil Properties in In-Situ Conditions to Develop "Soil Management/Mapping Units" Using High-Resolution Remotely Sensed Data Sets	Agriculture	\$9,922	Track II
Leslie Suters	Developing Math and Science Computational Thinking Practices for Teaching at the Elementary, K-5 Level	Curriculum and Instruction	\$10,000	Track II
Yunbo Zhang	Investigation of Multi-directional Additive Manufacturing Process and Design Method	Mechanical Engineering	\$10,000	Track II
			<b>\$69,920</b>	