

# Annual Report 2015



Graduate School

WASHINGTON STATE UNIVERSITY





## Dean's Message

The 2015 annual report on graduate education shows how much we have accomplished toward our goal of providing service, oversight, and advocacy to our students, faculty, alumni, and the institution. As dean of the Graduate School, I am proud of our student accomplishments and of the great mentorship provided by our faculty.

I am pleased to report that Washington State University had a total of 3,592 graduate students enrolled across all of our campuses, not including our professional programs (DVM, PharmD, MBA). We awarded 864 graduate degrees in the 2015 fiscal year that were distributed across all ten of our colleges: 574 were at the master's level and 290 were at the doctoral level. Over the past two years, the number of under-represented minority graduate students has increased by 12%, and the number of international students by 9.7%. These numbers speak to the Washington State University land-grant mission of inclusion and diversity both in our student ranks and within our curricular tracks.



As our institution moves forward toward becoming one of the very best land-grant research-extensive universities in the United States, our graduate students will contribute significantly to that goal. Our graduates not only populate the professoriate but are also placed throughout the private and government sectors. They continue to pursue research and scholarship in national laboratories, state agencies, international corporations, small businesses, nonprofit institutions, and in many other locations both regionally and globally.

Please enjoy this annual snapshot of Washington State University's graduate education accomplishments. I am confident that graduate education will grow and help students, faculty, and the institution meet our challenges and aspirations in the coming years.

A handwritten signature in black ink that reads "William Andrefsky, Jr." The signature is stylized with a large, sweeping flourish at the end.

Dr. William Andrefsky, Jr.  
Edward R. Meyer Distinguished Professor  
Dean of the Graduate School

# About Us

## Our Vision

Washington State University will be recognized as one of the nation's leading land-grant universities. Toward this end, graduate education will excel and achieve the highest level of excellence in doctoral, master's, and certificate programs.

## Our Mission

The overall mission of the Graduate School is to advance graduate education and enhance the experience of our graduate students. We further this mission by providing service, oversight, and advocacy for all aspects of the graduate enterprise at Washington State University.

The Graduate School's mission can be viewed as a triple-tier structure that encompasses the broad sweep of graduate education and scholarship. At our basic level, the graduate school provides a foundation of service to students, faculty, academic programs, colleges, and the overall institution. Service is where we reach people and programs on an ongoing basis. Next, we provide oversight for policies, standards for graduate education, and program and institutional assessment. Our oversight mission is directly related to administrative support for graduate education. Finally, we advocate for graduate education, research, diversity, and integrity on campus, in the state, nation, and globally. Through recruitment of students, leveraging of grant proposals, or working with our donors and sponsors, the graduate school provides advocacy on a continuous basis.

To advance the Graduate School mission, we embrace the challenge to work collectively with colleges, degree granting programs, faculty, students, prospective students, alumni, and their associated administrative and representative units.

## Our Role

The Graduate School operates as a central service unit within Washington State University with a focus on graduate enrollment management, program review and assessment, recruitment, student advocacy, and service to the university.

### Recruitment, Admission, and Retention

The Graduate School actively recruits under-represented populations through various programs, and manages requests for information from prospective students. Working collaboratively with academic departments and other administrative offices, we serve graduate students from the time the student submits an inquiry form or application for admission through to graduation and commencement participation. As part of the recruitment and retention process, the Graduate School offers a number of scholarships and awards and also works closely with the GPSA to provide professional development opportunities for graduate students.

### Registration and Enrollment

The Graduate School is responsible for graduate student registration and enrollment as well as any enrollment changes, exceptions, or issues throughout each graduate student's academic career at WSU. Students from other careers work with the academic department and the Graduate School to enroll in graduate courses. The Graduate School also processes assistantship waivers and issues immigration paperwork for newly admitted international students.

### Program of Study and Exams

The Graduate School works with the department in the submission and approval of the graduate student's program of study, which is the contract between the student, the department, and the university of the student's requirement toward the advanced degree. Preliminary and Final Examination results are reviewed and recorded by the Graduate School.

### Degree Audit and Graduation

The Graduate School performs a final degree audit for each student based on the program of study on file, and reviews final theses and dissertations for correct formatting. Prior to commencement, the Graduate School reviews student eligibility and confers each degree. Following final exams, the Graduate School mails out the official graduate diplomas.

### Graduate Program Review and Assessment

The Graduate School conducts program reviews for all doctoral and master's degree programs on a 3-year cycle. Graduate program review is an internal, objective process that involves a review of data provided by each program, a review of data provided by Institutional Research, and an evaluation of the program's policies and practices that support students. In addition, the Graduate School coordinates graduate program assessment of student learning, which evaluates each degree program's quality and effectiveness, stimulates program planning and improvement, and encourages graduate programs to develop and grow in areas that reflect the university's strategic priorities.





# Graduate Students at WSU Campus Locations

## Tri-Cities

The WSU Tri-Cities campus connects graduate students with private companies, including Pacific Northwest National Laboratory and Lockheed Martin, to provide hands-on research and internships.

Applications	Admissions	*Enrollment
111	73	66

\*Enrollment includes students admitted to graduate programs on other campuses

## Spokane

The WSU Spokane Riverpoint Campus represents the latest in health science laboratories and classroom technology. Graduate students at our Spokane location focus on health sciences, education, and social and policy sciences.

Applications	Admissions	*Enrollment
577	213	155

\*Enrollment includes students admitted to graduate programs on other campuses

## Vancouver

WSU Vancouver is the only four-year research university in Southwest Washington, offering graduate degrees in accounting, business computer science, education, environmental science, mechanical engineering, nursing, prevention science, public affairs, and teaching.

Applications	Admissions	*Enrollment
329	191	142

\*Enrollment includes students admitted to graduate programs on other campuses

## Global

Global degree programs include master's degrees in criminal justice, special education (EdM), strategic communication, executive MBA, MBA, engineering and technology management (METM), agriculture, food science and management, plant health management, electric power engineering (PSM), and molecular biosciences (PSM).

Applications	Admissions	*Enrollment
829	460	248

\*Enrollment includes students admitted to graduate programs on other campuses

## Pullman

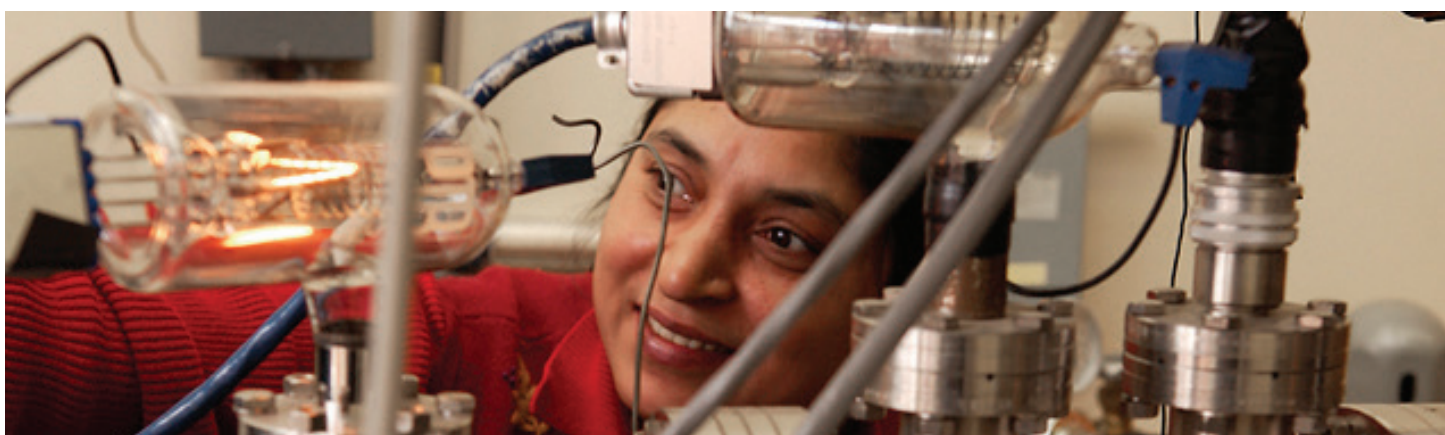
WSU is a tier-one research institution with more than 120 master's, doctoral, and professional degree programs. Graduate students at WSU are at the core of important research initiatives centered around our five grand challenges: sustaining health, sustainable resources, opportunity and equity, smart systems, and national security.

Applications	Admissions	*Enrollment
3,971	1,131	635

\*Enrollment includes students admitted to graduate programs on other campuses

## Total Graduate Admissions All Campuses

Domestic	1,505
<u>International</u>	<u>368</u>
Total Admitted	1,873
Total Enrolled	1,355
Enrolled/Admitted	72%



# Quick Look

## 2015 WSU Graduate School Admissions

### Enrolled

2015 Applied	5,122
2015 Admitted	2,068
2015 New Enrolled*	1,098

Total Graduate Students  
enrolled in 2015

**\*3,592**

\*Includes certificate, non-degree seeking, and undecided students. Does not include students in professional programs (DVM, PharmD, MBA). Source: IR Quick Facts.

### Enrolled Degrees

#### 2015 New Enrollment

Doctoral	384
Master's	575

#### Total Enrollment for 2015

Doctoral	1,937
Master's	1,384
Other	271

\*Includes certificate, non-degree seeking, and undecided students. Does not include students in professional programs (DVM, PharmD, MBA). Source: IR Quick Facts.

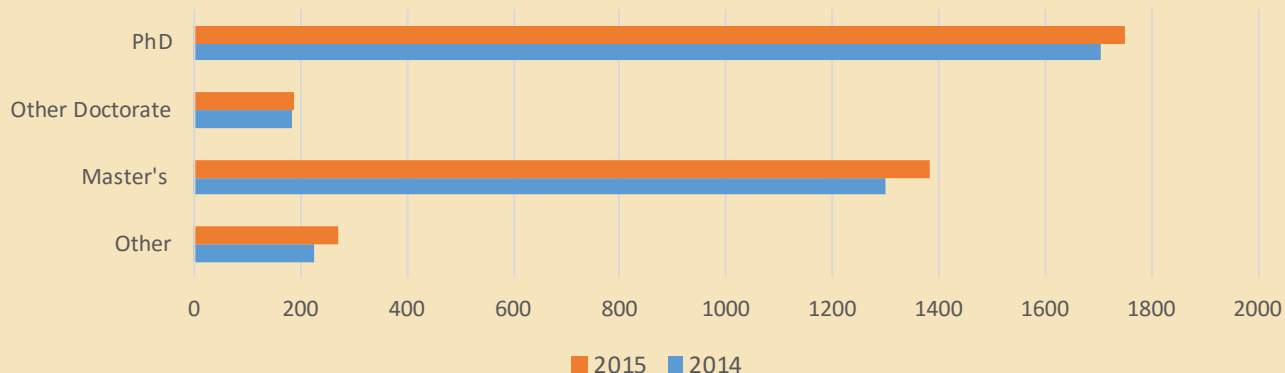
### Total Enrollment Comparison

Graduate Degree	Fall 2014	Fall 2015	% Change
Ph.D.	1,703	1,750	+2.8%
Other Doctorate*	182	187	+2.7%
Master's (excluding MBA)	1,300	1,384	+6.5%
Other**	226	271	+19.9%

\*Other doctorates include all non-PhD, non-professional doctorate level degrees offered.

\*\*Other includes all certificates, non-degree seeking, and undecided.

2014/2015 enrollment comparison



## Quick Look

### 2015 WSU Graduate School Admissions

#### Degrees Awarded

	2014	2015
Doctorate	260	290
Master's*	638	574
Total	898	864

\*Excluding MBA



#### Enrollment by Diversity

WA residents	2,381	66%
Out-of-state	936	26%
International	952	26.5%
Minority	688	19%
Female	2,037	56.7%
Median Age	30	

Source: IR Quick Facts

#### Funding

##### Assistantships

1,799 students  
50%

##### Fellowships

159 students  
\$2,572,763

##### Tuition Waivers

Full: 2,420 students  
Half: 177 students

##### Scholarships

Graduate School: 36  
Amount Awarded: \$73,000

NSF GRFP Fellows: 11  
Amount Awarded: \$506,000

ARCS\*: 36  
Amount Awarded:  
\$207,000

\*Achievement Awards for College Scientists

# Graduate Degree Programs/ Year Programs Began

## Doctor of Philosophy

Agricultural Economics (1940)  
 Animal Sciences (1942)  
 Anthropology (1965)  
 Biological and Agricultural Engineering (2006)  
 Biology (2015)  
 Business Administration: (1984)  
     Accounting  
     Finance  
     Hospitality and Tourism  
     Information Systems  
     Management  
     Marketing  
     Operations and Management Science  
 Chemical Engineering (1984)  
 Chemistry (1934)  
 Civil Engineering (1984)  
 Communication (2002)  
 Computer Science (1969)  
 Criminal Justice and Criminology (2013)  
 Crop Science (1991)  
 Economics (1958)  
 Education: (1939)  
     Cultural Studies and Social Thought in Ed  
     Educational Leadership  
     Educational Psychology  
     Language, Literacy and Technology  
     Mathematics & Science Education  
     Special Education  
 Electrical and Computer Engineering (1984)  
 Engineering Science (1964)  
 English (1965)  
 Entomology (1940)  
 Environmental and Natural Rsrce Sci. (2006)  
 Food Science (1961)  
 Geology (1942)  
 History (1938)  
 Horticulture (1930)  
 Individual Interdisciplinary (1981)  
 Materials Science and Engineering (2011)  
 Mathematics (1957)  
 Mechanical Engineering (1984)  
 Molecular Biosciences (2008)  
 Molecular Plant Sciences (2003)  
 Neuroscience (1993)  
 Nursing (2007)  
 Pharmaceutical Sciences (2010)  
 Physics (1947)  
 Plant Biology (Botany) (2015)  
 Plant Pathology (1929)  
 Political Science (1946)  
 Prevention Science (2011)  
 Psychology: (1949)  
     Psychology-Clinical  
     Psychology-Experimental  
 Sociology (1942)  
 Soil Science (1962)  
 Veterinary Science: (1957)  
     Combined Anatomic Pathology Residency  
     Combined Clinical Microbiology Residency  
     Immunology and Infectious Diseases  
     Integrative Physiology and Neuroscience  
     Veterinary Clinical Training Program

## Master of Arts

Anthropology (1957)  
 Apparel, Merch., Design, and Textiles (1990)  
 Communication:  
     Communication (1990)  
     Strategic Communication: (2013)  
 Criminal Justice and Criminology: (2013)  
 Education: (1909)  
     Curriculum and Instruction  
     Educational Leadership  
     Educational Psychology  
     English Language Learner  
     Literacy Education  
     Special Education  
     Sport Management  
 English (1915)  
 Foreign Languages and Cultures (2003)  
 History (1928)  
 Interior Design (1990)  
 Music (1923)  
 Political Science (1932)

## Master of Science

Agriculture: (2000)  
     Agriculture  
     Food Science and Management  
     Plant Health Management  
 Animal Sciences (1965)  
 Applied Economics (2011)  
 Biological and Agricultural Engineering (2006)  
 Biology (1974)  
 Chemical Engineering (1948)  
 Chemistry (1905)  
 Civil Engineering (1916)  
 Computer Engineering (2004)  
 Computer Science (1963)  
 Computer Science – Vancouver (2004)  
 Coordinated Prgm in Dietetics, Nutrition &  
     Exercise Physiology (2011)  
 Crop Science (1991)  
 Electrical Engineering (1916)  
 Engineering (1974)  
 Entomology (1931)  
 Environmental Engineering (1973)  
 Environmental Science (1968)  
 Food Science (1961)  
 Geology (1922)  
 Horticulture (1959)  
 Materials Science & Engineering (1977)  
 Mathematics (1979)  
 Mechanical Engineering (1914)  
 Mechanical Engineering – Vancouver (2004)  
 Molecular Biosciences (2008)  
 Natural Resource Sciences (1990)  
 Neuroscience (1993)  
 Physics (1909)  
 Plant Biology (2015)  
 Plant Pathology (1959)  
 Soil Science (1959)  
 Speech and Hearing Sciences (1990)  
 Statistics (1992)  
 Veterinary Science: (1957)  
     Combined Anatomic Pathology Residency  
     Combined Clinical Microbiology Residency

Immunology and Infectious Diseases  
 Integrative Physiology and Neuroscience  
 Veterinary Clinical Training Program

## Specialized Degrees

Accounting (MAcc) (1981)  
 Architecture (M.Arch.) (2002)  
 Education: (1937)  
     Curriculum and Instruction (EdM)  
     Educational Leadership (EdD)  
     Educational Leadership (EdM)  
     English Language Learners (EdM)  
     Literacy Education (EdM)  
     Special Education (EdM)  
     Elementary Education (MIT) (1991)  
     Secondary Education (MIT) (1991)  
 Engineering and Tech Mngmnt (METM) (2005)  
 Master of Fine Arts (MFA) (1941)  
 Health Policy and Admin (MHPA) (1994)  
 Nursing: (1982)  
     Family Nurse Practitioner (MN, DNP)  
     Population Health (MN, DNP)  
     Population Health (MN, DNP)  
     Psychiatric/Mental Health Nurse Practitioner  
     (MN, DNP)  
 Public Affairs (MPA) (1995)

## Professional Science Masters (PSM)

Electrical Power Engineering (2014)  
 Molecular Biosciences (2012)

## Professional Degrees

Administered by the College of Pharmacy and  
 College of Veterinary Medicine:  
     Doctor of Pharmacy (1993)  
     Doctor of Veterinary Medicine (1913)  
 Administered by the Carson College of Business:  
     Master of Business Administration (1957)

## Graduate Certificates

Bioethics (2014)  
 Constraints Management (2008)  
 Construction Project Management (2008)  
 Digital Humanities and Culture (2015)  
 Educational Research Methods (2016)  
 Engineering Nanotechnology (2008)  
 Global Justice and Security Studies (2008)  
 Health-Assistive Smart Environ. Design (2014)  
 Logistics and Supply Chain Management (2008)  
 Manufacturing Leadership (2008)  
 Molecular Biosciences (2010)  
 Nuclear Engineering (2010)  
 Nurse Educator (2010)  
 Nursing Leadership (2010)  
 Project Management (2008)  
 Protein Biotechnology (2001)  
 Radiation Protection (2016)  
 Six Sigma Quality Management (2008)  
 Systems Engineering Management (2008)  
 Sustainable Agriculture (2007)



# Graduate Degrees by College

## Agriculture, Human, and Natural Resource Sciences

Agriculture, MS  
 Agriculture  
 Food Science Management  
 Plant Health Management  
 Agricultural Economics, PhD  
 Animal Sciences, PhD, MS  
 Apparel, Merchandising, Design & Textiles, MA  
 Applied Economics, MS  
 Biological and Ag. Engineering, PhD, MS  
 Crop Science, PhD, MS  
 Economics, PhD  
 Entomology, PhD, MS  
 Environ. and Natural Resource Sciences, PhD  
 Food Science, PhD, MS  
 Horticulture, PhD  
 Interior Design, MA  
 Molecular Plant Sciences, PhD\*  
 Natural Resource Sciences, MS  
 Plant Pathology, PhD, MS  
 Prevention Science, PhD, MA  
 Soil Science, PhD, MS

## Arts + Sciences

Anthropology, PhD, MA  
 Applied Economics, MS  
 Biology, PhD, MS  
 Chemistry, PhD, MS  
 Criminal Justice and Criminology, PhD, MA  
 English, PhD, MA  
 Environmental Science, MS  
 Master of Fine Arts, MFA  
 Foreign Languages and Cultures, MA  
 Geology, PhD, MS  
 History, PhD, MA  
 Mathematics, PhD, MS  
 Molecular Plant Sciences, PhD\*  
 Music, MA  
 Physics, PhD, MS  
 Plant Biology (Botany), PhD, MS  
 Political Science, PhD, MA  
 Psychology, PhD  
 Clinical  
 Experimental  
 Master of Public Affairs, MPA  
 Sociology, PhD  
 Statistics, MS

## Carson College of Business

Business Administration PhD:  
 Accounting  
 Finance  
 Hospitality and Tourism  
 Information Systems  
 Management  
 Marketing  
 Operations and Management Science  
 Master of Business Administration, MBA\*\*  
 Master of Accounting, MAcc

## Edward R. Murrow College of Communication

Communication, PhD, MA  
 Strategic Communication, MA

## Education

Community Counseling, MA  
 Counseling Psychology, PhD  
 Educational Leadership, PhD, EdD, MA, EdM  
 Educational Psychology, PhD, MA  
 Master in Teaching, MIT:  
 Elementary Education, MIT  
 Secondary Education, MIT  
 Teaching and Learning, PhD, EdM, MA  
 Cultural Studies and Social Thought in Ed., PhD  
 Curriculum and Instruction, MA  
 English Language Learners, MA, EdM  
 Language, Literacy and Technology, PhD  
 Literacy Education, MA, EdM  
 Mathematics & Science Education, PhD  
 Special Education, PhD, MA, EdM  
 Sport Management, MA

## Graduate School

Individual Interdisciplinary, PhD  
 Materials Science and Engineering, PhD\*  
 Molecular Plant Sciences, PhD\*

## Nursing

Health Policy and Administration, MHPA  
 Doctor of Nursing Practice, DNP  
 Family Nurse Practitioner  
 Population Health  
 Psychiatric/Mental Health Nurse Practitioner  
 Master of Nursing, MN  
 Family Nurse Practitioner  
 Population Health  
 Psychiatric/Mental Health Nurse Practitioner  
 Nursing, PhD

## Voiland College of Engineering and Architecture

Architecture, M.Arch  
 Chemical Engineering, PhD, MS  
 Civil Engineering, PhD, MS  
 Computer Engineering, MS  
 Computer Science, PhD, MS  
 Computer Science - Vancouver, MS  
 Electrical Power Engineering, PSM  
 Electrical and Computer Engineering, PhD  
 Electrical Engineering, MS  
 Engineering, MS  
 Engineering Science, PhD  
 Engineering and Technology Management, METM  
 Environmental Engineering, MS  
 Materials Science and Engineering, MS, \*PhD\*  
 Mechanical Engineering, PhD, MS  
 Mechanical Engineering - Vancouver, MS

## Medicine

Speech and Hearing Sciences, MS

## Pharmacy

Pharmaceutical Sciences, PhD, MS  
 Doctor of Pharmacy, PharmD\*\*

## Veterinary Medicine

Molecular Biosciences, PhD, MS, PSM  
 Neuroscience, PhD, MS  
 Veterinary Science:  
 Combined Anatomic Pathology Residency, PhD, MS  
 Combined Clinical Microbiology Residency, PhD, MS  
 Immunology and Infectious Diseases, PhD, MS  
 Integrative Physiology and Neuroscience  
 Veterinary Clinical Training Prog., PhD, MS  
 Doctor of Veterinary Medicine, DVM\*\*

## WSU Spokane Health Sciences

Coordinated Programs in Dietetics, Nutrition & Exercise Physiology, MS  
 Nutrition and Exercise Physiology, PhD

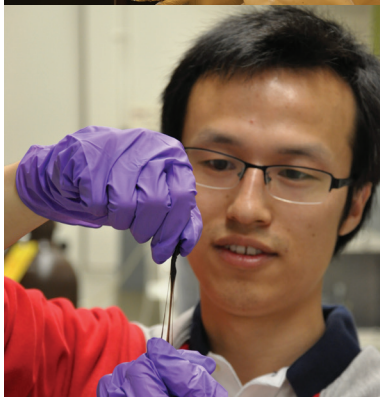
\* Interdisciplinary degrees that are affiliated with more than one college

\*\* Professional degrees administered by college

# Student Funding

## New Flex Waivers

	Fall 2014	# of Students	Spring 2015	# of Students	Grand total
AMIDEAST	\$18,704.00	2	\$18,704.00	2	\$37,408.00
Based on GS commitments	135,880.00	24	146,424.00	26	282,304.00
CONACYT / SENISCYT	21,664.40	5	18,269.90	5	39,934.30
CSC	551,448.00	49	538,915.00	51	1,090,363.00
SCGSR Fellowship	-	0	10,544.00	2	10,544.00
Fulbright	389,610.00	33	377,622.00	36	767,232.00
GAANN	27,804.00	4	33,076.00	5	60,880.00
Financial/Medical Need Based	37,174.00	7	36,046.00		73,220.00
NIH BioTech	43,761.77	13	46,493.57	15	90,255.34
PNNL	29,249.00	3	17,260.00	2	46,509.00
Punjab University MOU	6,716.00	1	-		6,716.00
Paul Allen School Fellowship	6,364.00	2	6,364.00	2	12,728.00
USAID Indonesia	15,816.00	3	10,544.00	Tuition	26,360.00
<b>Total</b>	<b>\$1,298,023.27</b>	<b>157</b>	<b>\$1,260,262.47</b>	<b>159</b>	<b>\$2,544,453.64</b>



## Graduate Student Assistantships Awarded

Teaching Assistants	941
Research Assistants	699
Staff Assistants	102
Project Assistants	37
Vet Resident GA	20
<b>Total</b>	<b>1,799</b>

## Tuition Waivers

Total # of full waivers	2,420
All But Dissertation Waiver	137
All But Dissertation Non Res. Waiver	68
Full Non-resident Waiver	682
Full In-state Waiver	1,315
Full Qualified Tuition Reduction	217
<b>Total # of half waivers</b>	<b>177</b>
Half Non-resident Waiver	62
Half In-state Waiver	98
Half Qualified Tuition Reduction	17



# 2015 First Annual Evening of Excellence



The Graduate School honored 36 graduate student scholarship recipients and their faculty mentors at its first annual Evening of Excellence. The new scholarships, established by the Graduate School with donor funds, were awarded to students nominated by their departments. In 2015, \$73,000 was awarded to graduate students. Photos by WSU Photo Services.



Graduate student Kakali Chakrabarti, a recipient of the Graduate School STEM Scholarship, and her son.



Graduate student Taylor Sisk and faculty member Phyllis Erdman. Taylor is a recipient of the Anne and Russ Fuller Award.



Graduate student Jason Watts, recipient of the Richard R. and Constance M. Albrecht Scholarship.



Graduate student Daegoon Lee, recipient of the Arnold and Julia Greenwell Memorial Scholarship.



# Student Success



## Chrystal Quisenberry

Chrystal's research in the School of Chemical Engineering and Bioengineering centered on progressing joint disease treatment by focusing on articular cartilage tissue engineering. She met her mentor, **Dr. Nehal Abu-Lail**, when she was an undergraduate, and attributes her success to Abu-Lail's mentorship. During her graduate school tenure, Chrystal was awarded 13 scholarships and awards, presented at 24 conferences, and published four peer-reviewed articles. In 2016 she was awarded the Harriett B. Rigas Award for her exceptional performance in academics, teaching, mentoring, and service to the community. As an undergraduate student at WSU, Chrystal was a Cougar of Color ambassador; as a graduate student, she mentored under-represented prospective students interested in STEM fields. She also volunteered for events such as the Seattle Science Festival, Future Cities Competition, and Cougar Undergraduate Research Experience. Chrystal graduated with her Ph.D. in Chemical Engineering and Bioengineering in summer 2016.



## Joseph Taylor

Joseph was awarded an NSF Graduate Research Fellowship in 2016 to conduct research on ways to help insect predators better manage crop-destroying insects to eventually reduce the use of pesticides. His entomology mentor, **Dr. William Snyder**, assisted him in writing the winning grant proposal. In addition to the NSF award, Joseph is also the recipient of a Research Assistantship for Diverse Scholars and an ARCS (Achievement Rewards for College Scientists) scholarship. With a lifelong interest in predators, Joseph earned a bachelor's degree in biology with a minor in Russian language from Washington and Lee University. There, he not only played football, but he also conducted research on the praying mantis, an interest that ultimately led him to graduate school at Washington State University. When he graduates, Joseph hopes to work for the USDA on pest management.



## Tiffany Alvarez

Tiffany is a student in evolutionary anthropology studying life history theory and immune behaviors, an interest that began when she was an undergraduate student at UNLV. At WSU, under the mentorship of **Dr. Edward Hagen**, Tiffany is seeking to understand the inter-relationships between immunity, substance use, and life histories. Her research with Hagen will determine if pregnancy and age of first birth affect substance use behaviors in ways predicted by life history theory. Tiffany is a first-generation college student on a streamline track to earn her master's and doctoral degrees in 5 years. As a McNair Alumna and teaching assistant, she has the opportunity to spread her passion for research to other students. Graduate students at WSU in evolutionary anthropology have a strong record of research funding and are regularly involved in research and teaching from their first semester.



# Faculty Mentors

## Nehal Abu-Lail

Nehal Abu-Lail has been in the Gene and Linda Voiland School of Chemical Engineering and Bioengineering since 2006 as an assistant and associate professor. She earned her Ph.D. in chemical engineering from Worcester Polytechnic Institute in Worcester, Mass., and her M.S. and B.S. in chemical engineering from Jordan University of Science and Technology in Irbid, Jordan. She has been the recipient of grants from NSF, NIH, DOD and 3M, and published more than 45 peer-reviewed manuscripts. She is currently investigating microbial interactions and virulence in the *Listeria* family. Abu-Lail has received numerous awards and honors, including a 2013 Fulbright scholarship and Reid Miller College of Engineering Teacher of the Year award. Her Ph.D. dissertation received the American Institute of Chemists Award for outstanding Ph.D. thesis in 2004. She currently works with five graduate students in her laboratory, including Chrystal Quisenberry.

## William Snyder

William Snyder has been a professor in the Department of Entomology at WSU since 2000. He earned his Ph.D. in entomology from the University of Kentucky in 1999, and spent a year as a postdoc fellow in the Department of Zoology at the University of Wisconsin-Madison. He also holds a M.S. in zoology from Clemson University and a B.A. in biology from the University of Delaware. William has been the PI/co-PI on more than a dozen USDA and NSF federal grants, including a recent \$2.6 million, 5-year grant on "MAP-PSILDS-PNW: Mapping and Predicting Psyllid Sources, Immigration and Locality-Specific Disease Spread in the PNW." In addition to his extensive grant-writing expertise, Snyder has also been subject editor of several publications and contributing writer for more than 60 published articles. His laboratory includes a diverse group of graduate students interested in finding natural solutions to problems in species conservation, sustainable agriculture, and human health with a goal to reduce the conflict between species conservation and feeding a growing human population.

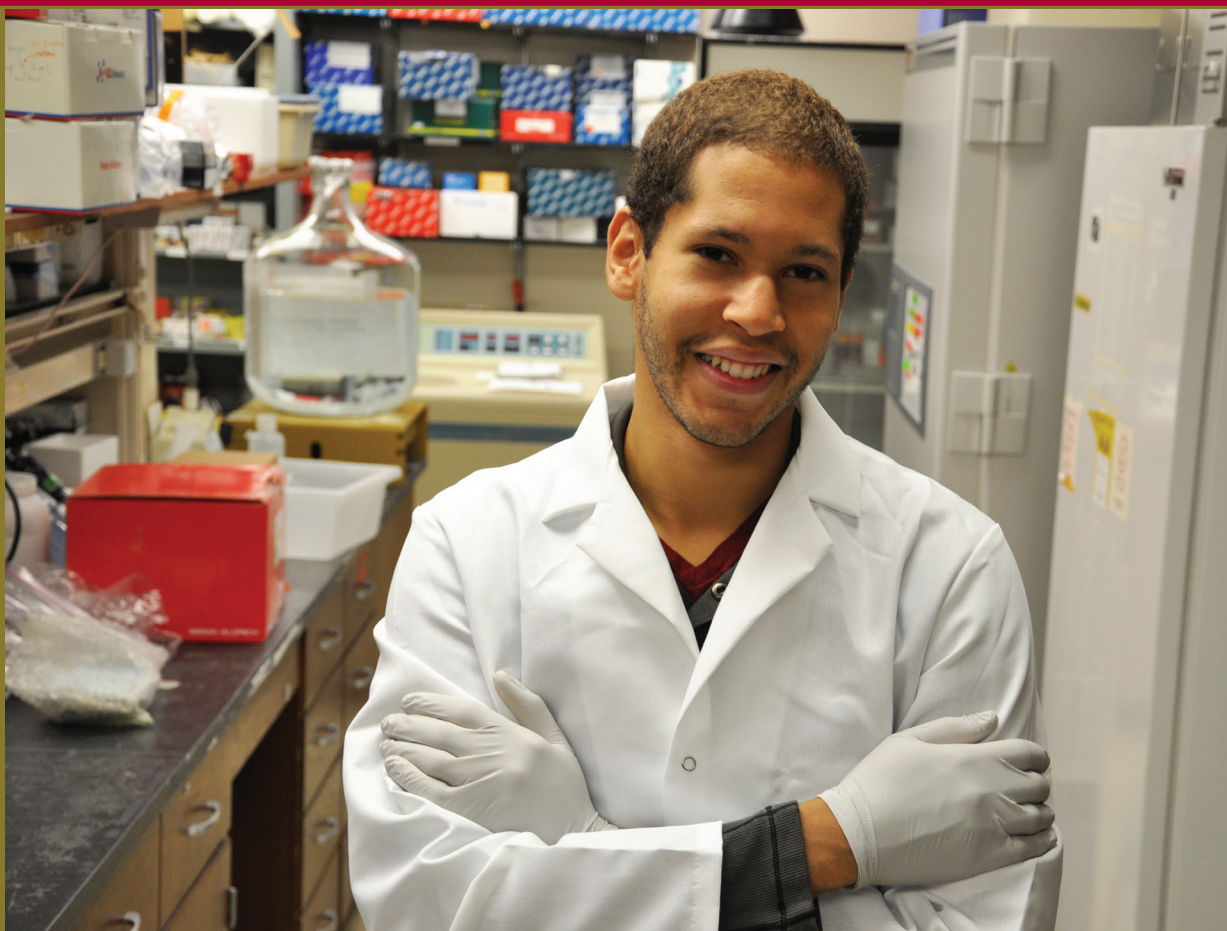
## Edward Hagen

Edward Hagen has been at WSU since 2007 and is director of the Bioanthropology laboratory on the Vancouver campus focusing on evolutionary models of substance use, specifically tobacco and cannabis use in central African foragers. He earned a B.A. in mathematics from Berkeley and a Ph.D. in anthropology from UC Santa Barbara. He served as a postdoc at the Institute for Theoretical Biology at Humboldt University in Berlin. He researches tobacco use in the larger context of human use of plant secondary compounds, looking at depression, suicide, and deliberate self-harm as potential signaling strategies. Hagen also recently began testing evolutionary models of leadership, as part of a more general interest in the evolution of human social organization. He has published a number of theoretical papers on evolutionary approaches to ontogeny, cognition, and behavior.



## Student Scholarships and Donors

### Meet Korey Brownstein



In 2015, the Graduate School established six new scholarship opportunities for students, including the Ann Chittenden Holland Master's Thesis Award, the Arnold and Julia Greenwell Memorial Scholarship for Social Sciences and Humanities, the Richard R. and Constance M. Albrecht Scholarship, the Russ and Anne Fuller Fellowship for Interdisciplinary Research/Scholarship, the Graduate School STEM scholarship, and the Charles Allen Master's Thesis Award. The first annual Evening of Excellence in 2015 recognized the 36 new graduate student scholarship recipients and their mentors.

Among these high-achieving scholars is Korey Brownstein, a recipient of the Russ and Anne Fuller Fellowship for Interdisciplinary Research and ARCS Foundation Fellow. Korey is pursuing a doctoral degree in molecular plant sciences at Washington State University.

In 2012, Korey received a NSF GRFP at the University of Missouri, where he graduated summa cum laude. In 2013, he transferred to WSU to explore his interest in ethnobotany and biochemistry in Dr. David R. Gang's laboratory, where he is developing new methods to expand the field of archeometry with the goal of better understanding historical and prehistorical uses of various medicinal plants by Native Americans.

Korey says that the Anne and Russ Fuller Fellowship has enabled him to achieve his educational and professional goals. "I am honored that my potential has been recognized," he says. "WSU is one of few universities in the world with experts from both the Department of Anthropology and the Institute of Biological Chemistry (IBC) who can make my interdisciplinary project work. I am proud to be among collaborators with similar interests and ideas and thankful that this fellowship will help me form professional relationships with those at WSU and beyond."

Korey received a B.A. degree in interdisciplinary studies in plant science and general biology from the University of Missouri, Columbia. He studied the way plants bend towards light and the ecology of urban forests and plants used to treat diseases and back pain. After graduation, he was the first American student to be admitted to the Hanoi University of Agriculture in Vietnam on a fellowship to discover new plants and their medicinal uses.

When he completes his Ph.D. at WSU, Korey wants to work in academia to promote the importance of medicinal plants and the conservation of their ecosystems. In addition to his academic work, Korey has published two poetry chapbooks and a philosophy book titled, *A Thesis on the Theory of Parallelism*, in 2011.



# New Graduate School Initiatives

## New Graduate Management Module

The Graduate Research Management (GRM) is a new module in myWSU designed specifically for graduate education. The module is intended to replace departmental and Graduate School shadow systems by centralizing student data in myWSU and making it readily available to departments and the Graduate School to aid in organizational planning and student advising. The module employs an electronic approval process to make form approval and processing more fluid and efficient.

The GRM is being introduced through a phased release schedule. The Graduate School uploaded data on all active students in August 2015 and has continuously maintained that data for all students with an active graduate degree. In January 2016, the initial stages of GRM's electronic form submission process went live, allowing departments to submit forms to the Graduate School within myWSU and to track these forms through to completion. The second stage of electronic form submission is expected to release by early fall 2016 and will expand upon the electronic signature approval process. The GRM committee is currently developing a means for faculty to vote on preliminary and final exams in myWSU.

The Graduate School and Enterprise Systems (ES) are also working together to bring the Program of Study into myWSU, allowing students to initially see their minimum degree requirements so they can work in concert with their advisor to accurately plan their first semesters of enrollment. Once the proper documentation is submitted and approved, the degree audit will show each student his/her unique Program of Study and real-time progress toward completing their degree.

Queries accessing GRM data are already allowing departments and the Graduate School to track faculty effort on committees, including efforts spent on committees outside the faculty member's discipline. They are also helping to identify students in need of personal attention and address issues before they have a negative impact.

## Video Interviewing Prospective Students

The Graduate School is implementing a new CollegeNET product that allows departments to ask questions to prospective graduate school candidates in video format. The applicant views the questions and answers by recording a short video. This is a good option for interviewing candidates that departments are interested in pursuing further, and for checking language skills. Departments will have access to the finished interviews via an online portal in the CollegeNET system.

## AGEP Grant

Washington State University is part of an eight-institution alliance awarded \$2.4 million in 2014 by the National Science Foundation's Alliances for Graduate Education and the Professoriate-Transformation (NSF AGEPT) program for a 42-month project aimed at increasing the participation of Native Americans and Alaska Natives in STEM graduate programs (HRD grant #1432932).

The alliance, called PNW-COSMOS for "Pacific Northwest Circle of Success: Mentoring Opportunities in STEM," is composed of four lead institutions: Washington State University, University of Idaho, Montana State University, and University of Montana, and four partner institutions: Heritage University, Montana Tech, Northwest Indian College, and Salish Kootenai College. A unique feature of PNW-COSMOS is the development of mentoring communities composed of faculty, staff, students, and members of Indigenous communities. This community provides support for Native students from recruitment through completion of their graduate program. Learn more about PNW-COSMOS activities and participating institutions at [pnwcosmos.org](http://pnwcosmos.org).

## Professional Development Initiative

The Professional Development Initiative (PDI) is organized by the Graduate School and the Graduate and Professional Student Association (GPSA), and has received support through many partnerships and colleges across campus. This initiative aims to provide a range of programs, training opportunities, and resources to graduate and professional students that will help prepare them for academic and career success. The goal of PDI is to ensure that all graduate and professional students have the skills, knowledge, and mindsets necessary to succeed both professionally and academically.

Through this initiative, the Graduate School and the GPSA have developed a series of core competencies that are intended to guide students through their programs and help them transition into their future role in academia or industry. The following core competencies are inclusive of master's and doctoral students across disciplines and applicable to a wide range of professional settings:

- Academic and Career Development
- Communication and Collaboration
- Leadership and Professionalism
- Personal Well-being

A number of workshops have been scheduled throughout the academic year. Visit [gradschool.wsu.edu/pdi](http://gradschool.wsu.edu/pdi) to learn about upcoming events.

# Reports

## Graduate School Admissions by Graduate Degree, Fall 2014–Fall 2015

DOCTORAL PROGRAMS	APPLICATIONS		ADMISSIONS		NEW ENROLLMENTS				
	2014	2015	2014	2015	2014	2015			
Agricultural Economics, Ph.D.	23	32	7	9	4	1			
American Studies, Ph.D.	35	4	8	0	5	0			
Animal Sciences, Ph.D.	8	7	2	2	1	0			
Anthropology, Ph.D.	55	36	29	20	15	12			
Biological and Agricultural Engineering, Ph.D.	50	56	17	12	8	10			
Botany, Ph.D.	13	18	2	8	2	5			
Business Administration, Ph.D.	218	164	35	22	26	16			
Chemical Engineering, Ph.D.	77	62	20	14	13	7			
Chemistry, Ph.D.	135	119	29	46	21	22			
Civil Engineering, Ph.D.	53	86	9	19	5	12			
Communication, Ph.D.	36	36	9	12	5	7			
Computer Science, Ph.D.	60	86	15	18	7	12			
Counseling Psychology, Ph.D.	83	94	18	12	4	6			
Criminal Justice, Ph.D.	24	22	16	8	7	4			
Crop Science, Ph.D.	29	18	6	4	5	3			
Economics, Ph.D.	57	69	19	26	10	16			
Educational Leadership, Ed.D.	41	38	19	8	15	5			
Educational Leadership, Ph.D.	10	10	3	7	1	5			
Educational Psychology, Ph.D.	12	13	3	3	2	2			
Electrical Engineering, Ph.D.	102	96	26	20	13	11			
Engineering Science, Ph.D.	11	13	3	9	3	8			
English, Ph.D.	42	31	9	7	4	4			
Entomology, Ph.D.	16	17	2	4	2	4			
Environmental and Natural Resource Sciences, Ph.D.	21	23	2	8	1	6			
Food Science, Ph.D.	44	33	4	1	2	0			
Geology, Ph.D.	10	11	3	4	2	4			
History, Ph.D.	17	11	7	6	3	5			
Horticulture, Ph.D.	23	19	6	8	5	4			
Individual Interdisciplinary, Ph.D.	2	5	1	4	1	4			
Integrative Physiology and Neuroscience, Ph.D.	5	4	0	0	0	0			
Language, Literacy, and Technology, Ph.D.	18	27	2	14	1	9			
Materials Science and Engineering, Ph.D.	101	124	16	22	8	10			
Mathematics, Ph.D.	64	57	45	29	19	11			
Mechanical Engineering, Ph.D.	60	84	26	19	17	10			
Molecular Biosciences, Ph.D.	79	41	12	14	8	7			
Molecular Plant Sciences, Ph.D.	37	66	13	14	7	10			
Neuroscience, Ph.D.	44	40	11	8	6	2			
Nursing Practice, D.N.P.	92	138	58	69	41	48			
Nursing, Ph.D.	10	15	6	11	4	7			
Pharmaceutical Sciences, Ph.D.	54	75	9	6	7	5			
Physics, Ph.D.	93	82	25	31	5	10			
Plant Pathology, Ph.D.	33	37	6	3	3	1			
Political Science, Ph.D.	35	29	20	10	8	0			
Prevention Science, Ph.D.	20	22	7	9	6	8			
Psychology, Ph.D.	246	243	20	27	13	20			
Sociology, Ph.D.	50	39	5	16	5	6			
Soil Science, Ph.D.	10	10	5	2	3	2			
Teaching and Learning, Ed.D.	4	1	3	0	3	0			
Teaching and Learning, Ph.D.	64	91	13	21	9	11			
Veterinary Science, Ph.D.	38	36	6	11	6	10			
Zoology, Ph.D.	31	38	11	11	9	7			
Grand Total	2495	2528	+1 %	648	668	+3 %	380	389	+2 %



MASTER'S PROGRAMS	APPLICATIONS		ADMISSIONS		NEW ENROLLMENTS	
	2014	2015	2014	2015	2014	2015
Accounting, M.Acc.	88	54	24	29	17	17
Agriculture, M.S.	37	36	32	28	21	19
American Studies, M.A.	10	0	2	0	1	0
Animal Sciences, M.S.	11	18	2	11	1	9
Anthropology, M.A.	31	33	5	10	1	8
Apparel, Merchandising, and Textiles, M.A.	16	15	9	6	5	4
Applied Economics, M.A.	0	1	0	1	0	1
Applied Economics, M.S.	22	30	8	16	1	6
Architecture, M.Arch.	47	86	28	43	17	33
Biological and Agricultural Engineering, M.S.	16	34	2	10	2	6
Biology, M.S.	26	11	4	2	3	2
Botany, M.S.	9	11	1	4	1	3
Chemical Engineering, M.S.	36	31	5	5	4	3
Chemistry, M.S.	19	12	0	2	0	2
Civil Engineering, M.S.	59	71	19	24	8	9
Communication, M.A.	44	32	9	7	2	2
Computer Engineering, M.S.	23	26	1	1	1	0
Computer Science - Vancouver, M.S.	25	19	3	6	3	3
Computer Science, M.S.	99	146	10	16	4	13
Coord. Prg. Dietetics, Nutrition, and ExPhys., M.S.	43	60	29	33	21	26
Counseling, M.A.	30	24	19	19	7	10
Criminal Justice, M.A.	27	25	15	14	8	4
Crop Science, M.S.	21	29	2	7	1	6
Education, M.A.	70	67	32	27	18	19
Educational Administration, M.A.	16	8	2	2	0	1
Educational Leadership, Ed.M.	35	34	30	22	26	19
Educational Psychology, Ed.M.	4	0	0	0	0	0
Electrical Engineering, M.S.	181	146	14	16	8	9
Electrical Power Engineering, P.S.M.	10	14	10	14	8	12
Engineering and Tech. Management, M.E.T.M.	25	40	19	30	16	22
Engineering, M.S.	1	3	0	2	0	0
English Language Learners, Ed.M.	3	5	0	4	0	3
Entomology, M.S.	4	13	0	2	0	2
Environmental Engineering, M.S.	29	33	10	13	5	6
Environmental Science, M.S.	46	50	13	17	9	13
Fine Arts, M.F.A.	26	24	6	6	6	6
Food Science, M.S.	94	75	14	14	8	10
Foreign Languages and Cultures, M.A.	9	6	5	3	5	3
Geology, M.S.	28	28	9	2	8	2
Health Policy and Administration, M.H.P.A.	34	41	23	32	13	19
History, M.A.	11	24	5	19	3	8
Horticulture, M.S.	17	30	3	9	2	8
Interior Design, M.A.	22	22	10	11	4	5
Landscape Architecture, M.S.	11	10	2	1	1	0
Master in Teaching, M.I.T.	72	62	43	44	39	34
Materials Science and Engineering, M.S.	51	45	13	13	7	7
Mathematics, M.S.	24	22	10	11	4	3
Mechanical Engineering - Vancouver, M.S.	20	14	14	8	12	6
Mechanical Engineering, M.S.	65	69	29	26	16	11
Molecular Biosciences, M.S.	17	12	0	2	0	1
Molecular Biosciences, P.S.M.	14	12	6	9	5	7
Music, M.A.	29	20	17	13	8	7
Natural Resource Sciences, M.S.	10	6	3	3	2	2
Natural Resources, M.S.	0	1	0	0	0	0
Neuroscience, M.S.	5	4	2	0	1	0
Nursing, M.N.	12	16	7	11	6	7
Physics, M.S.	15	17	2	3	1	2

MASTER'S PROGRAMS(CONT...)	APPLICATIONS		ADMISSIONS		NEW ENROLLMENTS	
	2014	2015	2014	2015	2014	2015
Plant Pathology, M.S.	17	30	2	3	2	2
Political Science, M.A.	6	10	1	4	1	1
Prevention Science, M.S.	0	1	0	0	0	0
Public Affairs, M.P.A.	14	11	8	5	5	4
Sociology, M.A.	7	7	1	2	1	0
Soil Science, M.S.	6	7	5	1	3	1
Speech and Hearing Sciences, M.A.	281	0	27	0	25	0
Speech and Hearing Sciences, M.S.	0	219	0	27	0	25
Sport Management, M.A.	32	43	17	21	12	18
Statistics, M.S.	18	14	4	3	0	0
Strategic Communication, M.A.	75	74	59	52	48	39
Teaching and Learning, Ed.M.	47	48	25	35	16	26
Veterinary Science, M.S.	19	16	8	11	7	11
Zoology, M.S.	24	20	3	3	3	3
<b>Grand Total</b>	<b>2,295</b>	<b>2,277</b> <b>-1 %</b>	<b>742</b>	<b>850</b> <b>+15 %</b>	<b>493</b>	<b>570</b> <b>+16 %</b>

## Graduate School Degrees Conferred by Discipline, FY2015

DISCIPLINE	Doctoral	Master's	Total
Accounting		29	29
Accounting (Ph.D. in Business Administration)	2		2
Agriculture			
Agriculture		2	2
Food Science and Management		2	2
American Studies	1		1
Animal Sciences		5	5
Anthropology	8	6	14
Apparel, Merchandising, and Textiles		4	4
Applied Economics		7	7
Architecture		9	9
Biological and Agricultural Engineering	11	8	19
Biology		1	1
Botany	3	3	6
Chemical Engineering	7	2	9
Chemistry	10	8	18
Civil Engineering	2	12	14
Communication	4	5	9
Computer Engineering		2	2
Computer Science	8	8	16
Computer Science - Vancouver		4	4
Counseling/Counseling Psychology	3	13	16
Cr'd Prog in Dietetics, Nutrition, and Exercise Physiology		18	18
Criminal Justice and Criminology	7	13	20
Crop Science	5	6	11
Cultural Studies and Social Thought in Education		5	5
Curriculum and Instruction		16	16
Design	2		2
Economics	8		8
Educational Administration	1		1
Educational Leadership	15	11	26
Educational Psychology	3	2	5

<b>DISCIPLINE</b>	<b>Doctoral</b>	<b>Master's</b>	<b>Total</b>
Electrical Engineering	11	11	22
Engineering and Technology Management		29	29
Engineering/Engineering Science	5		5
English	8	10	18
English as a Second Language		4	4
English Language Learners		5	5
Entomology	6	3	9
Environmental and Natural Resource Sciences	5		5
Environmental Engineering		10	10
Environmental Science		13	13
Finance (Ph.D. in Business Administration)	1		1
Fine Arts		6	6
Food Science	1	5	6
Foreign Languages and Cultures		2	2
Geology	3	3	6
Health Policy and Administration		15	15
Higher Education	2		2
History	5	6	11
Horticulture	6	5	11
Hospitality and Tourism (Ph.D. in Bus. Admin.)	2		2
Immunology and Infectious Diseases	2	3	5
Individual Interdisciplinary	5		5
Interior Design		2	2
Landscape Architecture		2	2
Language and Literacy Education	5		5
Language, Literacy, and Technology	1		1
Literacy Education		5	5
Management (Ph.D. in Bus. Admin.)	2		2
Marketing (Ph.D. in Bus. Admin.)	3		3
Materials Science	4		4
Materials Science and Engineering	4	7	11
Mathematics	6	8	14
Mechanical Engineering	9	9	18
Mechanical Engineering - Vancouver		10	10
Molecular Biosciences	8		8
Molecular Biosciences, P.S.M.		5	5
Molecular Plant Sciences	6		6
Music		8	8
Natural Resource Sciences		2	2
Neuroscience	4		4
Nursing	2		2
Nursing Practice			
Advanced Population Health		3	3
Community-based/Population-focused Care		3	3
Family Nurse Practitioner	8	19	27
Nursing Practice - General	1		1
Psychiatric/Mental Health Nurse Practitioner		1	1
Operations (Ph.D. in Business Administration)	3		3
Pharmaceutical Sciences	3		3
Physics	9	6	15
Plant Pathology	6	6	12
Political Science	2	12	14
Prevention Science		7	7
Psychology			
Clinical Psychology	5	4	9
Experimental Psychology	7	6	13
Public Affairs		5	5

DISCIPLINE	Doctoral	Master's	Total
Sociology	4	6	10
Soil Science	4	4	8
Special Education	4	7	11
Speech and Hearing Sciences		22	22
Sport Management		14	14
Statistics		8	8
Strategic Communication		2	2
Teacher Leadership	2		2
Teaching			
Elementary		16	16
Secondary		22	22
Veterinary Science			
Combined Anatomic Pathology Residency	3		3
Combined Clinical Microbiology Residency	1		1
Veterinary Clinical Training Program	2	10	12
Veterinary Science	4	1	5
Zoology	1	6	7
<b>Grand Total</b>	<b>290</b>	<b>574</b>	<b>864</b>

## Graduate School Total Enrollment by Discipline, Fall 2015

DISCIPLINE	Doctoral	Master's	Total
Accounting		26	26
Accounting (Ph.D. in Business Administration)	9		9
Agricultural Economics	11		11
Agriculture			
Agriculture		30	30
Food Science and Management		21	21
Plant Health Management		11	11
American Studies	15	1	16
Animal Sciences	9	11	20
Anthropology	56	21	77
Apparel, Merchandising, and Textiles		11	11
Applied Economics		13	13
Architecture		47	47
Biological and Agricultural Engineering	64	15	79
Biology		6	6
Botany	18	5	23
Chemical Engineering	52	4	56
Chemistry	100	13	113
Civil Engineering	40	24	64
Communication	29	6	35
Computer Engineering		6	6
Computer Science	58	28	86
Computer Science - Vancouver		9	9
Counseling/Counseling Psychology	38	20	58
Coord. Pgrm. in Dietetics, Nutrition, and Ex. Phys.		46	46
Criminal Justice and Criminology	31	14	45
Crop Science	34	11	45
Cultural Studies and Social Thought in Education	29		29
Curriculum and Instruction		41	41
Economics	68		68
Educational Leadership	64	65	129



DISCIPLINE	Doctoral	Master's	Total
Educational Psychology	12	4	16
Electrical Engineering	64	32	96
Electrical Power Engineering, P.S.M.		17	17
Engineering and Technology Management		77	77
Engineering/Engineering Science	35	2	37
English	18	23	41
English as a Second Language		2	2
English Language Learners		9	9
Entomology	17	6	23
Environmental and Natural Resource Sciences	42		42
Environmental Engineering		12	12
Environmental Science		41	41
Finance (Ph.D. in Business Administration)	10		10
Fine Arts		14	14
Food Science	18	17	35
Foreign Languages and Cultures		9	9
Geology	12	15	27
Health Policy and Administration		40	40
Higher Education	4		4
History	14	12	26
Horticulture	23	17	40
Hospitality and Tourism (Ph.D. in Business Administration)	7		7
Human Development		1	1
Immunology and Infectious Diseases	32	5	37
Individual Interdisciplinary	13		13
Information Systems (Ph.D. in Business Administration)	9		9
Integrative Physiology and Neuroscience	1		1
Interior Design		11	11
Landscape Architecture		2	2
Language and Literacy Education	7		7
Language, Literacy, and Technology	19		19
Literacy Education		14	14
Management (Ph.D. in Business Administration)	16		16
Marketing (Ph.D. in Business Administration)	9		9
Materials Science	2		2
Materials Science and Engineering	59	20	79
Math and Science Education	14		14
Mathematics	57	17	74
Mechanical Engineering	62	44	106
Mechanical Engineering - Vancouver		23	23
Molecular Biosciences	43	4	47
Molecular Biosciences - P.S.M.		19	19
Molecular Plant Sciences	52		52
Music		16	16
Natural Resource Sciences		10	10
Neuroscience	25		25
Nursing	35		35
Nursing Practice			
Advanced Population Health	4	26	30
Community-based/Population-focused Care		1	1
Family Nurse Practitioner	90	10	100
Nursing Practice-General	14		14
Psychiatric/Mental Health Nurse Practitioner	24	2	26
Nutrition and Exercise Physiology	4		4
Operations (Ph.D. in Business Administration)	10		10
Pharmaceutical Sciences	21		21
Physics	53	12	65
Plant Pathology	25	10	35

DISCIPLINE	Doctoral	Master's	Total
Political Science	20	5	25
Prevention Science	30	10	40
Psychology			
Clinical Psychology	32	8	40
Experimental Psychology	36	12	48
Psychology		1	1
Public Affairs		19	19
Sociology	33	9	42
Soil Science	18	7	25
Special Education	10	22	32
Speech and Hearing Sciences		52	52
Sport Management		35	35
Statistics		13	13
Strategic Communication		110	110
Teaching			
Elementary		21	21
Secondary		37	37
Teaching and Learning		1	1
Veterinary Science			
Combined Anatomic Pathology Residency	10		10
Combined Clinical Microbiology Residency	3		3
Veterinary Science	10	24	34
Zoology	34	13	47
<b>Total</b>	<b>1,937</b>	<b>1,500</b>	<b>3,437</b>
*Students may be enrolled in more than one graduate program (e.g. Ph.D. and M.S.).			

# Graduate Student Research Matters



Doctoral student Bernard Hall was part of a team of WSU physicists who contributed to the recent detection of gravitational waves in space, confirming a theory posed by Einstein about 100 years ago. The gravitational wave detection is significant because it provides a new window into space, telling the story of the origins of the universe and the nature of gravity. The wave is believed to be the result of two black holes, 29 and 36 times the mass of the sun, which collided in the southern hemisphere about 1.3 billion years ago. The energy generated from the collision was about 50 times that of the entire universe, rippling through space and creating a blip on the radar of a Laser Interferometer Gravitational Observatory (LIGO) in both Washington and Louisiana in September of 2015.

Formed from the collapse of stars as they burn out, black holes pack immense gravitational pull, and continue to grow while consuming dust and gases from around them. Black holes range in size from small to supermassive—the ones that are believed to hang at the center of every galaxy, including the Milky Way. Although black holes are invisible because their gravitation pull is too strong for light to escape, their presence can be detected through their interaction with other matter, sometimes creating some of the most brilliant objects in the universe. Astronomers can determine the size of black holes by measuring the path of the stars orbiting around them, and have thus estimated the supermassive black hole at the core of the Milky Way to be about 4.3 million solar masses.

When Einstein developed the theory of relativity—which basically predicts that a sufficiently compact mass can deform space-time to form a black hole, he believed that two black holes orbiting each other would lose energy through gravitation waves, drawing them together to finally collide. During that brief, powerful explosion, a portion of the black holes' mass is converted to energy, creating a powerful thrust that forms gravitational waves that ripple across space.

Hall is excited to be part of the team that first detected the gravitational wave. Originally from Georgia, Bernard moved to Post Falls as a teenager and was home schooled. After graduating, he attended IT Tech and earned a bachelor's degree in video game design. He worked in broadcast television for 12 years, then joined the Army Reserve as a medic for nine years. In 2003 he was deployed to Syria. After learning that President Obama had initiated a post-911 GI Bill for those who had been on active duty during the Gulf War, Hall decided to take advantage and study astrophysics. He attended Spokane Community College for two years, then transferred to WSU in 2012, where he began working with Dr. Sukanta Bose. After earning his Ph.D., Hall would like to continue his research.



# Graduate School

WASHINGTON STATE UNIVERSITY

[Gradschool.wsu.edu](http://Gradschool.wsu.edu)