Table of Contents

Welcome Letter .............................................................................. 3
Institute by the Numbers ............................................................. 4
Program Director’s Message ......................................................... 5
Scholarship by Industry ................................................................. 6
The Ph.D. Students ......................................................................... 7
CSAR Welcome ................................................................................ 8
Advisory Board ................................................................................ 9
Research Sponsors .......................................................................... 9
Funded Research by Dollar Amount ............................................... 10
Funded Research and Projects ....................................................... 11
This report reflects on the second year of operation for the Analytics and Data Science Institute.

Kennesaw State University’s recent promotion to “Research University with High Research Activity” places the university within an elite group of the top research universities in the country. This reclassification focuses greater attention on the research infrastructure and productivity across campus. This past year, the Analytics and Data Science Institute transitioned from being a “start-up” – with the associated intensity, energy and excitement – to being a highly productive, interdisciplinary research unit with more than 20 Ph.D. students, affiliated faculty from across campus and a wide range of external collaborators. The Institute team consistently references 2019 as being a year of “process” – where we have focused on formalizing and streamlining our processes, without impacting our innovative and entrepreneurial culture.

This past year was full of accomplishments for the Institute, as will be seen in this report. A few of our highlights include:

- **Graduating Ph.D. students from our first cohort.** As the first university to launch a formal Ph.D. program in Data Science, these graduates became the first true Ph.D.’s in Data Science in the world.

- **Sponsored Research Funding through our Center for Statistics and Analytical Research of $534,831 in the current year.** The Center engaged a total of 10 faculty from 6 colleges from across the university in research products across multiple domains including healthcare, finance, public policy, engineering and manufacturing. Over $1.5 million in external research funding in two years.

- **Acceptance of our fifth cohort of Ph.D. students.** The Ph.D. Program continues to maintain an acceptance rate of approximately 10% – making it one of the most competitive graduate programs in the country.

- **Data Science 7900.** The Institute offers graduate students across the university - regardless of major - an opportunity to work in an applied data science project course, giving all graduate students an opportunity to develop data literacy skills.

- **Women in Data Science.** Over 40% of the students in our Ph.D. program are women - one of the highest proportions in the country for a STEM-based graduate program. We host speakers from both academia and from the public sector four-to-six times a year.

As an interdisciplinary research unit, the Analytics and Data Science Institute continues to serve the university as a hub for collaborative research. Under the leadership team of Dr. Sherrill Hayes and Dr. Herman (Gene) Ray, and our administrative associate Ms. Cara Reeve, combined with an inspiring group of motivated and talented Ph.D. students, our primary objectives for the upcoming year include increased public sector research funding, further integrating the data science curriculum across the university, and attracting additional high-impact research faculty into the Institute.
Affiliated faculty from 5 colleges

Less than 10% acceptance rate

Over $1.5 MILLION in external research funding in two years

Over 40% of Ph.D. students are female

Affiliated faculty from 5 colleges

13 international students from 7 different countries

21 Ph.D. students

1st Ph.D. program in Data Science in the country
Sherrill Hayes, Ph.D.
Program Director for Analytics and Data Science

Entering my second year as Director of the Analytics and Data Science Ph.D. program, I continue to be amazed at and humbled by the outstanding work that our Ph.D. students are doing across the emerging discipline of Analytics and Data Science. Although it is my second year and the fifth year of the program, we continue to have “firsts,” and this year we had some of our most exciting ones to date.

In August 2018, we admitted five students into Cohort 4, bringing us to “full capacity” of 21 students for the first time in the program. Having a full house of students from year 1 to year 4 has presented some excellent opportunities for collaboration and peer mentoring. For example, we began the academic year with our Data Science Boot Camp, which was taught and facilitated by 3rd and fourth-year students for 1st year-students. The Boot Camp also included 30 graduate students from other KSU graduate programs, demonstrating the growing impact that our program is having on graduate education at KSU.

Perhaps the most exciting first this year was having our first graduate – Dr. Linh Le - who graduated in the May 2019 commencement. The research in his dissertation, “Deep Embedding Kernel,” has already resulted in three academic publications and a patent. The remainder of Cohort 1 will be graduating in 2019 and already have promising jobs awaiting them as tenure-track faculty, post-doctoral researchers, and practicing data scientists in industry. As we have more alumni, we will truly see the impact of our Ph.D. program on this emerging discipline.

This year, KSU was designated by the Carnegie Commission on Higher Education as an “R2” university, the first time KSU has been recognized nationally as a research university. Not only does this ranking place KSU in the top 6% of research universities in the United States, it serves as a platform to further the Ph.D. program’s core objective of producing high-quality graduate research. Our students continued to increase the scholarly footprint of KSU in the Analytics and Data Science community in 2018-2019 by publishing 14 journal articles/book chapters and over 20 papers in conference proceedings. The vast majority of these were co-authored with other students in the program and faculty advisors. Our Ph.D. students also won six first place and two second place awards for their research at regional, national, and international conferences.

Into 2020, we will continue our mission of educating the next generation of thought leaders in data science in the most interdisciplinary, intercollegiate, and interdepartmental graduate program on KSU’s campuses. We will accomplish that by working closely with faculty from across multiple departments and colleges across the campus to ensure that our students are progressing through the program into successful careers post-graduation.
<table>
<thead>
<tr>
<th>Ph.D. Student Research Publications by Application Domain</th>
<th>Number of Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare</td>
<td>14</td>
</tr>
<tr>
<td>Finance and Technology</td>
<td>17</td>
</tr>
<tr>
<td>Manufacturing and Supply Chain</td>
<td>5</td>
</tr>
<tr>
<td>Government and Public Policy</td>
<td>8</td>
</tr>
<tr>
<td>Privacy and Security</td>
<td>7</td>
</tr>
<tr>
<td>Innovations in Foundations of Data Science and Analytics</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>
The Ph.D. Students

COHORT 1

Bob Vanderheyden  
Bogdan Gadidov  
Edwin Baidoo  

Jie Hao  
Linh Le  
Sergiu Buciumas

COHORT 2

Jessica Rudd  
Lili Zhang  
Shashank Hebbar

Yan Wang  
Yiyun Zhou

COHORT 3

Andrew Henshaw  
Lauren Staples  
Liyuan Liu

COHORT 4

Jonathan Boardman  
Mdshafiu Alam  
Seema Sangari

Mohammad Masum  
Sanjoosh Akkineni

Srivarna Settisara Janney  
Tejaswini Mallavarapu
As the Director of The Center for Statistics and Analytical Research (CSAR), I am excited to report on the Center’s output from this past year. CSAR operates as a central hub of interdisciplinary research with external partners in both the private and public sectors. Faculty from a wide range of disciplines work together to solve complex data-centric problems - affiliated faculty come from Computer Science, Statistics, Engineering, Economics, Finance, Information Technology and Psychology. These collaborative research partnerships have resulted in patents, peer-reviewed publications, conference proceedings and, importantly, have provided a platform for student engagement.

This past year was “The Year of Process” with a focus on developing systems and processes to make CSAR efficient and self-sustaining. As part of our emphasis on improved processes, we standardized procedures for budgeting, reporting, contract review, and other day-to-day operations for the Center and its associated research labs. Activities which were cumbersome when we were in start-up mode are now streamlined.

This past year, the Center generated $546,831 in external research funding, with research collaborators in Healthcare, Finance, Manufacturing and Policy.

In the upcoming year, CSAR will be strategically focused on continuing to increase the research profile of the university. Our specific objectives include:

- Increasing the dissemination of the research findings through publications, presentations, and grant applications.
- Increasing the number of research partners within each of the industry sectors.
- Increasing the number of faculty and associated colleges working with CSAR.
- Increasing the number of federally funded grant applications associated with CSAR through partnerships with faculty members submitting externally funded grants.
Analytics and Data Science Institute Advisory Board

The Advisory Board for the Analytics and Data Science Institute includes business and thought leaders in the Finance, Retail, Hospitality, Healthcare, Technology, Management Consulting, and Energy sectors. This Board meets multiple times a year with the leadership of the Institute to provide insights related to the relevancy and the quality of the contributions of the Institute. The Board supports the academic program accountability of the Institute by providing guidance and feedback and serving as partners in research and in community collaborations.

Khalifeh AlJadda, Southern Data Science
Vickey Chang, Equifax
Bill Franks, The International Institute for Analytics
Will Hakes, ScoresMatter
Girish Modgil, GE Power
Eric Schmidt, InterContinental Hotels Group
Murray Webb, Healthgrades
Funded Research by Dollar Amount and Sector

FY 2018-2019

<table>
<thead>
<tr>
<th>Sector Funding</th>
<th>Awards</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare</td>
<td>2</td>
<td>$210,831</td>
</tr>
<tr>
<td>Finance and Technology</td>
<td>4</td>
<td>$171,000</td>
</tr>
<tr>
<td>Manufacturing and Supply Chain</td>
<td>2</td>
<td>$95,000</td>
</tr>
<tr>
<td>Government and Public Policy</td>
<td>1</td>
<td>$38,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9</strong></td>
<td><strong>$514,831</strong></td>
</tr>
</tbody>
</table>
### Funded Research and Projects 2018-2019 in Numbers

For the fiscal year period of July 1, 2018 to June 30, 2019

<table>
<thead>
<tr>
<th></th>
<th>Research Grants &amp; Projects</th>
<th>Direct Expenses</th>
<th>Indirect Expenses</th>
<th>Institute Operational Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average</strong></td>
<td>$41,140</td>
<td>$26,008</td>
<td>$14,804</td>
<td>$16,389</td>
</tr>
<tr>
<td><strong>Research Grants</strong></td>
<td>$514,831</td>
<td>$234,080</td>
<td>$133,244</td>
<td>$147,506</td>
</tr>
<tr>
<td><strong>Funded Instruction</strong></td>
<td>$20,000</td>
<td>$3,500</td>
<td>$1,482</td>
<td>$15,019</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$534,831</td>
<td>$237,580</td>
<td>$134,726</td>
<td>$162,525</td>
</tr>
</tbody>
</table>

- **Average**
  - Direct Expenses: $26,008
  - Indirect Expenses: $14,804
  - Institute Operational Costs: $16,389
  - Total: $534,831

- **Research Grants**
  - Direct Expenses: $234,080
  - Indirect Expenses: $133,244
  - Institute Operational Costs: $147,506
  - Total: $514,831

- **Funded Instruction**
  - Direct Expenses: $3,500
  - Indirect Expenses: $1,482
  - Institute Operational Costs: $15,019
  - Total: $20,000

- **Total**
  - Direct Expenses: $237,580
  - Indirect Expenses: $134,726
  - Institute Operational Costs: $162,525
  - Total: $534,831