THOMAS J. WATSON SCHOOL OF ENGINEERING AND APPLIED SCIENCE:

PROPOSED NAME CHANGE

BINGHAMTON UNIVERSITY | THOMAS J. WATSON SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Thomas J. Watson School of Engineering and Applied Science

Proposal for a Name Change

The Thomas J. Watson School of Engineering and Applied Science is submitting a formal request to change its name to the Thomas J. Watson College of Engineering and Applied Science. The growth of the school since its founding in 1983, the size of the school's current departments, and its potential for continued growth all support the change from "School" to "College".

History of the Watson School

The Thomas J. Watson School of Engineering and Applied Science at Binghamton University officially opened on June 15, 1983. Starting in 1980, a group of local business leaders spearheaded an effort to solve a problem that was plaguing many of them – a lack of a talent pool to meet the demands of the acceleration of high-technology growth in New York State. The School of Engineering, Applied Science and Technology (SEAST), as it was named, was to include five departments consolidating existing programs in Systems Science, Computer Science and Engineering Technology and adding Electrical Engineering, and Mechanical and Industrial Engineering. The National Center for Higher Education Management Systems, which was hired in 1981 to assess the educational needs of the Southern Tier and recommend a solution, projected that within five years, as the Watson School reached its full size, "the program would have nearly 500 full-time-equivalent students."

With its opening in 1983 and the hiring Dean Lyle Feisel, the founding dean, the school officially became the Thomas J. Watson School of Engineering and Applied Science. The school started with programs in electrical engineering, mechanical engineering and industrial engineering at the undergraduate level, mainly focused on transfer students as there was no first year program. In the early 1990s, doctoral programs in mechanical engineering, electrical engineering and computer science were started. Previously there was a PhD in Advanced Technology with various specializations. In the mid-2000s, doctoral programs in Industrial and Systems Engineering and Systems Science were started. The Bioengineering Department was started around the same time, with the graduate program starting in 2008. In 2014, the name of the Bioengineering Department was changed to Biomedical Engineering Department.

In the first year (1983-1984), 242 students graduated from the School. Last year, as Watson School enrollments reached 3,182 students (2018-19) – six times of the projections in the early 1980s – 901 students graduated including:

- 455 bachelor of science students
- 406 master's students
- and 40 doctoral recipients

from the departments of biomedical engineering, computer science, electrical and computer engineering, mechanical engineering, and systems science and industrial engineering as well as from the interdisciplinary materials science and engineering program.

The Thomas J. Watson School of Engineering and Applied Science provides a top-ranked engineering and computer science education. Our exceptional faculty members are both innovative researchers and supportive professors. Our graduate programs are ranked #95 in the nation and our engineering programs and computer science programs are ranked in the top 176 – 200 and top 201-250 respectively in the world by the Times Higher Education World University Rankings.

Students come to the Watson School from all over the world and represent a wide range of backgrounds and interests. They graduate with broad-based skills and the entrepreneurial spirit to succeed in fields ranging from mechanical engineering to hospital operations to the law. Today, the School has more than 15,000 alumni who are employed at more than 3,000 employers across the globe including at Fortune's Most Admired Companies, the top IT companies based on revenue and the Technology Review's most innovative companies.

The mission of the Watson School is to provide education and research in the broad field of engineering and applied science. To fulfill this mission, the School will:

- offer baccalaureate, master's and doctoral programs that prepare graduates for employment in the technical professions and combine
    - a firm grounding in fundamentals,
    - elements of practical application and
    - an appreciation for liberal learning.
- conduct basic and applied research which expands the technical knowledge base and advances industrial practice.
- provide support for the economic development of the State of New York.
- ensure that its programs are accessible to the widest possible range of individuals and institutions.
- work with industry and community partners, foster participation and representation from traditionally underrepresented groups in technical research and education.
- support the profession of engineering through continuing education opportunities for practicing professionals.

In fall 2018, the Watson School's engineering programs were reaccredited by ABET (the accreditation body for engineering and technology programs) without any concerns. All of our engineering departments received the highest possible review by their assigned teams and were commended for their outstanding work.

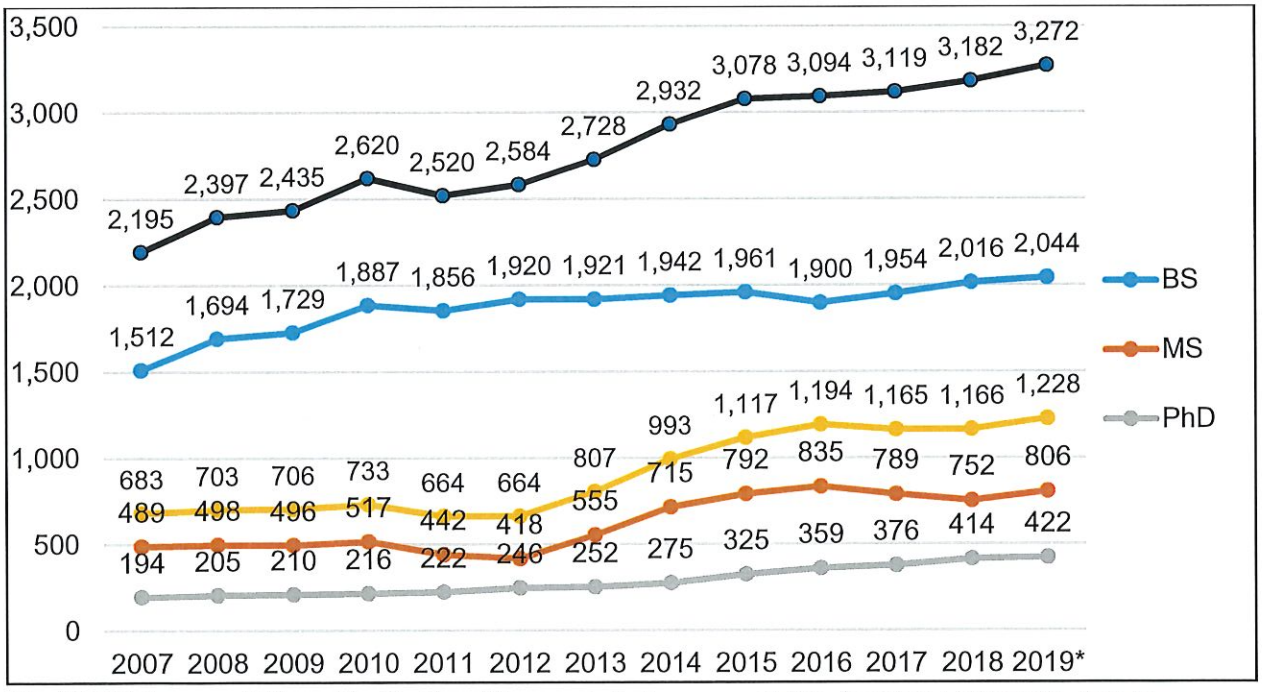
The Watson School currently has 5 departments and the engineering design division with the following academic programs:

- Biomedical Engineering (BS, MS, PhD)
- Computer Science (BS, MS, PhD)
- Electrical and Computer Engineering
    - BS in EE or CoE
    - MS and PhD
- Materials Science and Engineering (transdisciplinary) (MS, PhD)
- Mechanical Engineering (BS, MEng, MS, PhD)
- Systems Science and Industrial Engineering
    - Healthcare Systems Engineering (MS)
    - Health Systems (Exec MS)
    - Industrial and Systems Engineering (MEng, MS, PhD)
    - Systems Science (MS, PhD)

Additionally, most of our programs have a 4+1 option for a BS and MS.

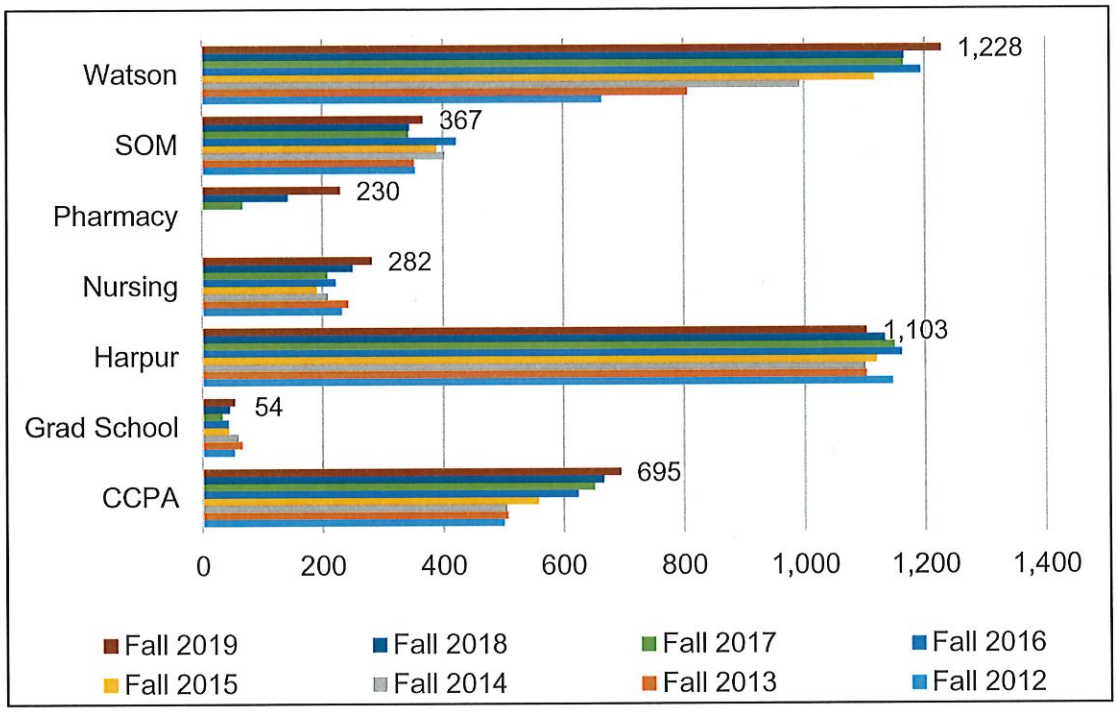
Growth of the Watson School

As of fall 2019, the Watson School has 3,272 students, with 2,044 undergraduates, 806 master's students and 422 doctoral students.



* Fall 2019 Source: Office of Institutional Research & Assessment, Binghamton University, Day 45 Enrollment

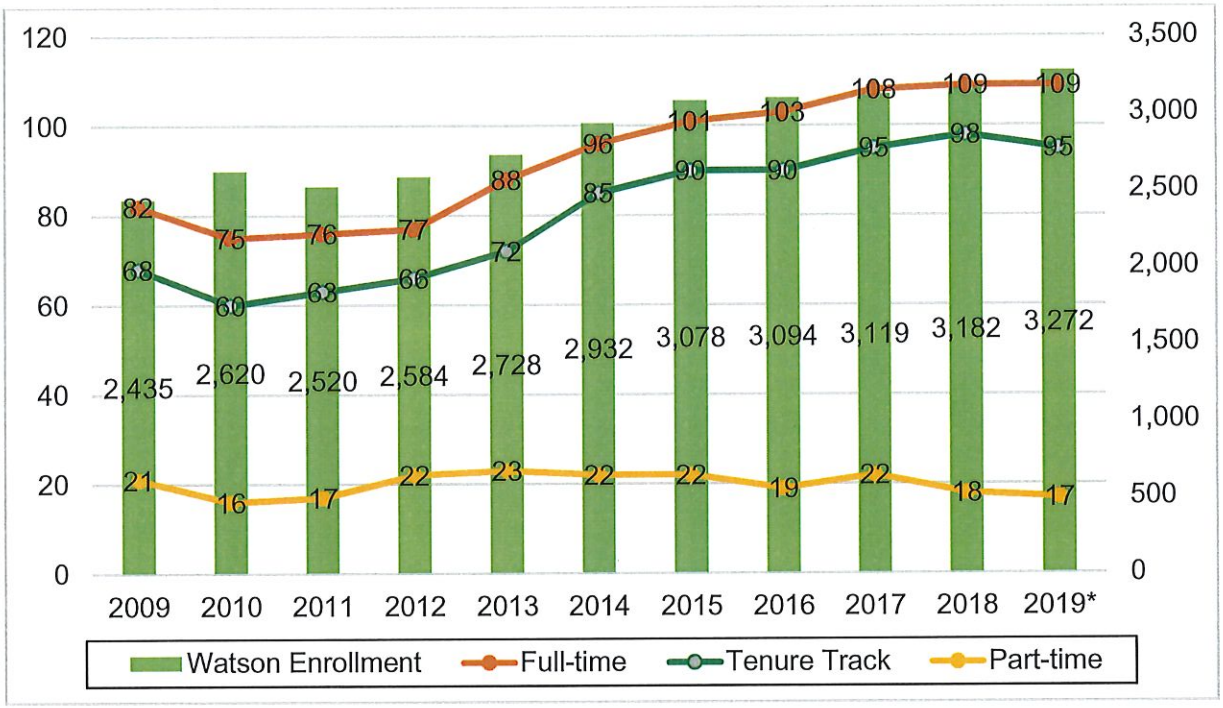
In fall 2000, the Watson School had 1,017 undergraduates and 437 graduate students. We've grown our graduate programs by 181% in nineteen years and our undergraduate by 100%. Since fall 2012, the Watson School has grown our graduate enrollments by 85% and our doctoral enrollments by 72%, which is when campus's focus on graduate enrollment growth began. We are now the largest graduate program at Binghamton University. Our Systems Science & Industrial Engineering Department has the largest doctoral program on campus with 182 doctoral



students. When combined, the graduate enrollment growth in our Computer Science Department and our Systems Science & Industrial Engineering Department accounts for 50% of the graduate growth on campus since fall 2011.

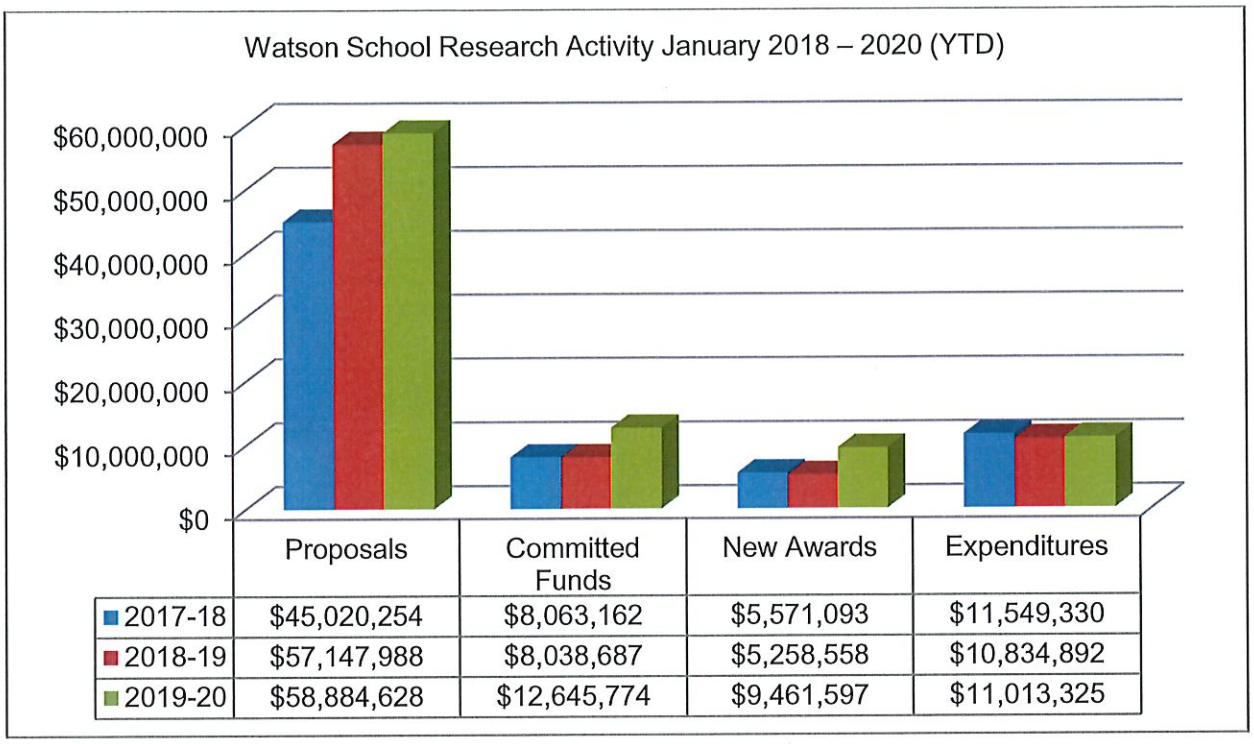
The Watson School continues to grow its graduate program offerings with a new Masters in Healthcare Systems Engineering. A Masters in Information Systems is currently going through the approval process and a Masters in Engineering Management will be available again soon. We continually look at opportunities to grow our academic offerings and provide the best academic experience possible to our students.

Along with student enrollment growth, the Watson School has also been able to grow its faculty numbers. Since 2012, we've grown our tenured/tenure-track faculty numbers by 18 (net).



We continue to remain committed to a low student to faculty ratio and the student experience in the classroom. The Watson School has grown and it has grown with quality.

Along with student growth, the Watson School has also grown its sponsored research. Since 2010, our research expenditures have grown from $12.8 million to over $18 million in 2018-19. For the year 2019-20, our new awards have almost doubled as of January YTD (shown below). In 2018-19, the Watson School accounted for 38% of University research expenditures and 43% of University research proposals submitted. The top ten departments with the highest research expenditures included 5 Watson departments. Growing our sponsored research is a focus for all of our departments and a top priority for all of our faculty.



	Proposals	Committed Funds	New Awards	Expenditures
2017-18	$45,020,254	$8,063,162	$5,571,093	$11,549,330
2018-19	$57,147,988	$8,038,687	$5,258,558	$10,834,892
2019-20	$58,884,628	$12,645,774	$9,461,597	$11,013,325

Our faculty are leaders in many research centers and groups at the university, including the following. In addition, two of our faculty lead the two Centers for Advanced Technology at Binghamton. Our faculty are collaborating with colleagues across departments and across campus.

- Small Scale Systems Integration and Packaging Center (S3IP)
- Center for Advanced Microelectronics Manufacturing (CAMM)
- Center for Autonomous Solar Power (CASP)
- Center for Collective Dynamics of Complex Systems (CoCo)
- Center for Energy-Smart Electronic Systems (ES2)
- Integrated Electronics Engineering Center (IEEC)
- Watson Institute for Systems Excellence (WISE)
- Center for Information Assurance and Cybersecurity (CIAC)
- Center of Biomanufacturing for Regenerative Medicine (CBRM)
- Center for Healthcare Systems Engineering (CHSE)
- Center for Imaging, Acoustics and Perception Science (CIAPS)

Watson School faculty are also recognized for excellence in research and teaching by receiving SUNY Chancellor's Awards, being named SUNY Distinguished Professors (8 as of today), Fellows in their professional societies (including IEEE, ASME, IISE, and BMES), and three inductees to the National Academy of Inventors.

The Watson School continues to grow and, in 2018, developed a 5 year growth plan which includes growth in enrollment, faculty, staff and sponsored research. This plan was developed based on many years of benchmarking studies conducted by the Watson team. The Watson School conducts benchmarking studies frequently to inform our new initiatives and to ensure we know what our competition is doing. The universities we benchmark against are the best in class for engineering and computer science and include: Penn State, Virginia Tech, Purdue, Texas A&M, and Georgia Tech. We also keep track of University at Buffalo and Stony Brook University, two competitors in the SUNY system. These studies have shown us that in order to increase our rankings and excel as a school, we need to (i) continue to grow our undergraduate and graduate programs with quality and, more specifically, our doctoral program enrollments, (ii) increase our externally sponsored research, and (iii) increase our brand awareness nationally and internationally. As informed by our benchmarking, the Dean has set a goal of $300,000 per faculty member of sponsored research by 2023. In FY19, we were at approximately $200,000 per faculty member and expect to exceed $215,000 per faculty member this year which will be greater per capita than what Stony Brook did last year. In addition, we have set a goal of 4,000 students by 2023, with approximately 2,600 undergraduate students and 1,400 graduate students.

In 2019, 5 strategic plans were developed by the Watson team. These plans are attached in Appendix C and include plans for (i) Communications and Marketing, (ii) Development, (iii) On-line Education, (iv) Diversity and Inclusive Excellence, and (v) Sponsored Research. In Appendix B, we are attaching a presentation made in February 2019 to the Watson School Advisory Board describes the current state of the Watson School for your reference.

Changing from "School" to "College"

In conducting these benchmarking studies and developing the strategic plans for the future of the Watson School, it is clear that in order to get better, we need to get bigger. Two of our departments that have shown the greatest growth over the last several years and show the greatest potential to grow are the Computer Science Department and the Systems Science and Industrial Engineering Department.

As of fall 2019, the Computer Science Department had 1,074 students and the Systems Science and Industrial Engineering Department had 611. Both of these departments are close to the size of two colleges on our campus – the Decker College of Nursing and Health Sciences and the College of Community and Public Affairs (CCPA). On our campus, the Decker College had 692 total students enrolled as of fall 2019 (an increase of 100 students since fall 2012) and CCPA had 1,252 students enrolled (an increase of 565 students since fall 2012). If you only look at our own campus, two of the departments in the Watson School are comparable to two colleges on our campus. Allowing the Watson School to become the Thomas J. Watson College of Engineering

and Applied Science will allow the departments within Watson to become their own Schools and, therefore, grow faster and compete with the best schools around the world.

Georgia Tech, Virginia Tech and Purdue all have "Colleges" of Engineering. All three have schools and departments within their College. For example, Georgia Tech has 8 schools within the College and one department. Purdue has 11 schools within the College plus two Divisions, while Virginia Tech has 12 departments and two schools within the College. Criteria for advancing from a department to a school within the College would need to be developed and adopted.

In Appendix A, you will find support letters from our five department chairs and our director of the Engineering Design Division, who unanimously support the name change. As Doug Summerville, chair of the Electrical and Computer Engineering Department wrote, "... 'college' carries a connotation that better reflects the scale of our unit, better reflects our place within Binghamton University, and better communicates the caliber of our research and programs to constituencies outside of the university."

Summary

The current size of the Watson School with over 3,000 students, over 100 faculty and over 60 staff members was unimaginable just 10 years ago. In looking at other universities with engineering programs of similar sizes and of a size that is inline with our strategic goals, the preponderance of these programs are named as a college with departments named as schools (depending on the departments student and faculty strength). Some of our departments have the enrollments to become a school – the Computer Science Department has over 1,000 undergraduate and graduate students and close to 30 tenured/tenure-track faculty. Renaming the Watson School to the Thomas J. Watson College of Engineering and Applied Science will allow us to grow even more and faster. We look forward to all that the college can achieve in the coming years.

Respectfully submitted by Dean Krishnaswami Srihari

February 19, 2020

Appendix A

BINGHAMTON
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STATE UNIVERSITY OF NEW YORK

Krishnaswami Srihari <srihari@binghamton.edu>

Support for Name Change

Michael S Elmore <melmore@binghamton.edu> Tue, Feb 11, 2020 at 10:14 AM
To: srihari@binghamton.edu

I would like to offer my support for the change of name of 'The Thomas J. Watson **School** of Engineering and Applied Science' to 'The Thomas J. Watson **College** of Engineering and Applied Science'.

High school students, who pursue post-secondary education, usually talk about attending college. The proposed name change is more in-line with what high school students see themselves attending. The name change might actually attract the attention of more high school students and result in even a stronger applicant pool.

Along the same idea, while at conferences faculty from different institutions often share with one another where they teach and/or do research. The perception, subjective as it may be, is that saying you are at a college or university, carries a little more prestige than saying you are at a school.

Hari, I hope this is of some help. It only represents my opinion. I was not able to find any source of information that might bring a little more gravitas to my comments.

Mike Elmore, PhD, PE

Director of Engineering Design Division

The Watson School

Binghamton University SUNY

607.777.2004

melmore@binghamton.edu

BINGHAMTON
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Krishnaswami Srihari <srihari@binghamton.edu>

SSIE Department's Support for name change to Thomas J. Watson College of Engineering and Applied Science

Mohammad T Khasawneh <mkhasawn@binghamton.edu> Sun, Feb 2, 2020 at 7:37 PM
To: Krishnaswami Srihari <srihari@binghamton.edu>
Cc: Mohammad T Khasawneh <mkhasawn@binghamton.edu>

Dear Hari,

I am delighted to let you know that the Department of Systems Science and Industrial Engineering (SSIE) fully supports the proposal to change the name of the Thomas J. Watson School of Engineering and Applied Science to the Thomas J. Watson College of Engineering and Applied Science. We strongly believe that this name change will recognize the significant growth that Watson has seen over the last decade and lay a strong foundation for further growth in the future. It is indeed noteworthy that today's Watson houses the two largest graduate programs at Binghamton University. In fact, two of the academic departments in Watson are larger than some schools on-campus. For example, our SSIE Department offers a total of eight degree programs, several academic concentrations, and a certificate program. With 175+ doctoral students, our department houses the largest doctoral program at Binghamton University and, according to US News and World Report, our Industrial and Systems Engineering graduate program is the highest ranked graduate program on-campus. I have already consulted with the senior faculty in the department and I am delighted to let you know that the support for the name change is unanimous. Thank you.

Sincerely,

Mohammad
--

Mohammad T. Khasawneh, Ph.D.
Professor and Chair, Systems Science and Industrial Engineering
Associate Director, Watson Institute for Systems Excellence
Director, Healthcare Systems Engineering Center
Graduate Program Director, Executive Master of Science in Health Systems
Thomas J. Watson School of Engineering and Applied Science
State University of New York at Binghamton
Binghamton, New York 13902

Phone: (607) 777-4408
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Email: mkhasawn@binghamton.edu

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Krishnaswami Srihari <srihari@binghamton.edu>

Name change for Watson School

Weiyi Meng <meng@binghamton.edu> Wed, Jan 29, 2020 at 4:11 PM
To: Krishnaswami Srihari <srihari@binghamton.edu>

Hi Hari,

I strongly and enthusiastically support to change the current name of the Watson School to Thomas J. Watson College of Engineering and Applied Science. This change will benefit the school as well as the entire campus in a number of ways. First, the new name is a much better reflection of the growth and size of the school. The growth and size of the school have now far exceeded the expectations of the school when the school was established. Making it a college can enhance Watson's status and profile among its peers and it will tell the world that Binghamton has a sizable and vibrant engineering program. Second, this change would allow some departments in the school to become their own schools within the Watson College in the future. For example, the Computer Science Department already has over 1,000 students with over 400 being graduate students, which is already larger than the originally visioned Watson School. The Computer Science Department is also developing several new degree programs (MSIS and MSAI). Transforming fast growing departments into schools can further help both faculty and student recruiting into their programs and make them more stand out among their peers. The model of a school within a college has worked in other universities (e.g., Georgia Tech and UMass).

The proposed name change from Watson School to Watson College will be a very positive change for all parties and I fully support it.

Thanks,
Weiyi
--
Weiyi Meng
Professor and Chair
Department of Computer Science
Binghamton University

BINGHAMTON
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Krishnaswami Srihari <srihari@binghamton.edu>

Watson School Transition to College of Engineering

Bruce T Murray <bmurray@binghamton.edu> Tue, Feb 4, 2020 at 2:26 PM
To: "Srihari, Krishnaswami" <srihari@binghamton.edu>

Hari,

I want to confirm that I agree with your recommendation that the Watson School of Engineering and Applied Science be reclassified as the Watson College of Engineering and Applied Science. The Watson School has seen significant growth and has reached the level in students (greater than 3000) and in the number of faculty that clearly warrants the designation as a college. With the growth in departments such as CS and SSIE, there is the very good possibility that they would transition into schools within the college at some point in the future. Clearly, it is time for the Watson School to make the transition to the designation as a college.

I have also presented this proposal for the change in designation to the faculty in the department. There was unanimous support by the faculty for the designation as a college. Please let me know if there is anything else I can do or the facuulty in the department can do to help with the reclassification effort.

Regards,
Bruce

Professor and Chair
Department of Mechanical Engineering

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Krishnaswami Srihari <srihari@binghamton.edu>

Support for Name Change to Watson College

Douglas H Summerville <dsummer@binghamton.edu> Thu, Jan 30, 2020 at 1:03 PM
To: "Srihari, Hari" <srihari@binghamton.edu>

Hari,

This email is to express my support, on behalf of the Department of Electrical and Computer Engineering, for changing the name of our school to the Watson *College* of Engineering and Applied Science. The Watson School has grown beyond what its founders envisioned in the 1980s and I believe the name change better reflects both where we are and where Watson is headed.

By nearly any metric, the Watson School has grown tremendously since its inception, with much of that growth occurring in the past decade. Watson's huge leap forward in the recent U.S. News rankings suggests that we have maintained quality in this growth. Watson currently has departments, such as Computer Science and System Science and Industrial Engineering, that are large enough to be schools in their own right; others are on growth trajectories that may take them to comparable size in the near future. Today, individual department metrics (e.g. research expenditures or degrees granted) likely rival those of the entire school a quarter century ago. Trends and demands in engineering and computer science also suggest this growth is likely to continue well into the future.

I believe that "college" carries a connotation that better reflects the scale of our unit, better reflects our place within Binghamton University, and better communicates the caliber of our research and programs to constituencies outside the university

Thank you,
Doug

--
Douglas H. Summerville, PhD
Professor and Chair
Department of Electrical and Computer Engineering
Binghamton University, State University of New York
Tel:(607)777-2942
Fax:(607)777-4464
Calendar

BINGHAMTON
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STATE UNIVERSITY OF NEW YORK

Krishnaswami Srihari <srihari@binghamton.edu>

Support letter

Kaiming Ye <kye@binghamton.edu> Thu, Jan 30, 2020 at 11:40 AM
To: Krishnaswami Srihari <srihari@binghamton.edu>

Dear Dean Srihari,

I would like to let you know that the Department of Biomedical Engineering supports fully the renaming of the "Thomas J. Watson School of Engineering and Applied Science" to "Thomas J. Watson College of Engineering and Applied Science". We truly believe that the School has grown considerably in not only size but ranking also under the leadership of Dean Srihari. To reflect this growth, renaming the school is essential, which will help attract more students and faculty to the university to further expand and grow our educational and research programs.

Best regards,

Kaiming

Kaiming Ye, PhD

Professor and Chair

Department of Biomedical Engineering

Director, Center of Biomanufacturing for Regenerative Medicine

Watson School of Engineering and Applied Science

PO Box 6000, Binghamton University, SUNY

Binghamton, NY 13902-6000

(O) 607-777-5887

(Assistant) 607-777-5774

(Fax) 607-777-5780

Email: kye@binghamton.edu

Appendix B

Thomas J. Watson School of Engineering and Applied Science

BINGHAMTON
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The Watson School
The Goal

Watson is a world class institution
for education in engineering
and applied science
with an international perspective.

Where are we today?

- Our ranking
- Our SAT scores
- Our faculty & staff
- Our accreditation
- Benchmarking
- Faculty and staff retention

A Top-Ranked SUNY School

#9

Best public university for return on investment after graduation.

Money

#16

Top public college in the U.S.

BUSINESS FIRST

Top 176 - 200 in the world for **engineering and technology**.

Top 201 - 250 in the world for **computer science.**

THE TIMES HIGHER EDUCATION WORLD UNIVERSITY RANKINGS

#31

Overall best public university in the United States.

U.S.News & WORLD REPORT

Top 6

Most affordable universities in the world for international students.

ADVISORYHQ

#7

U.S. public college for out-of-state / international students

Kiplinger

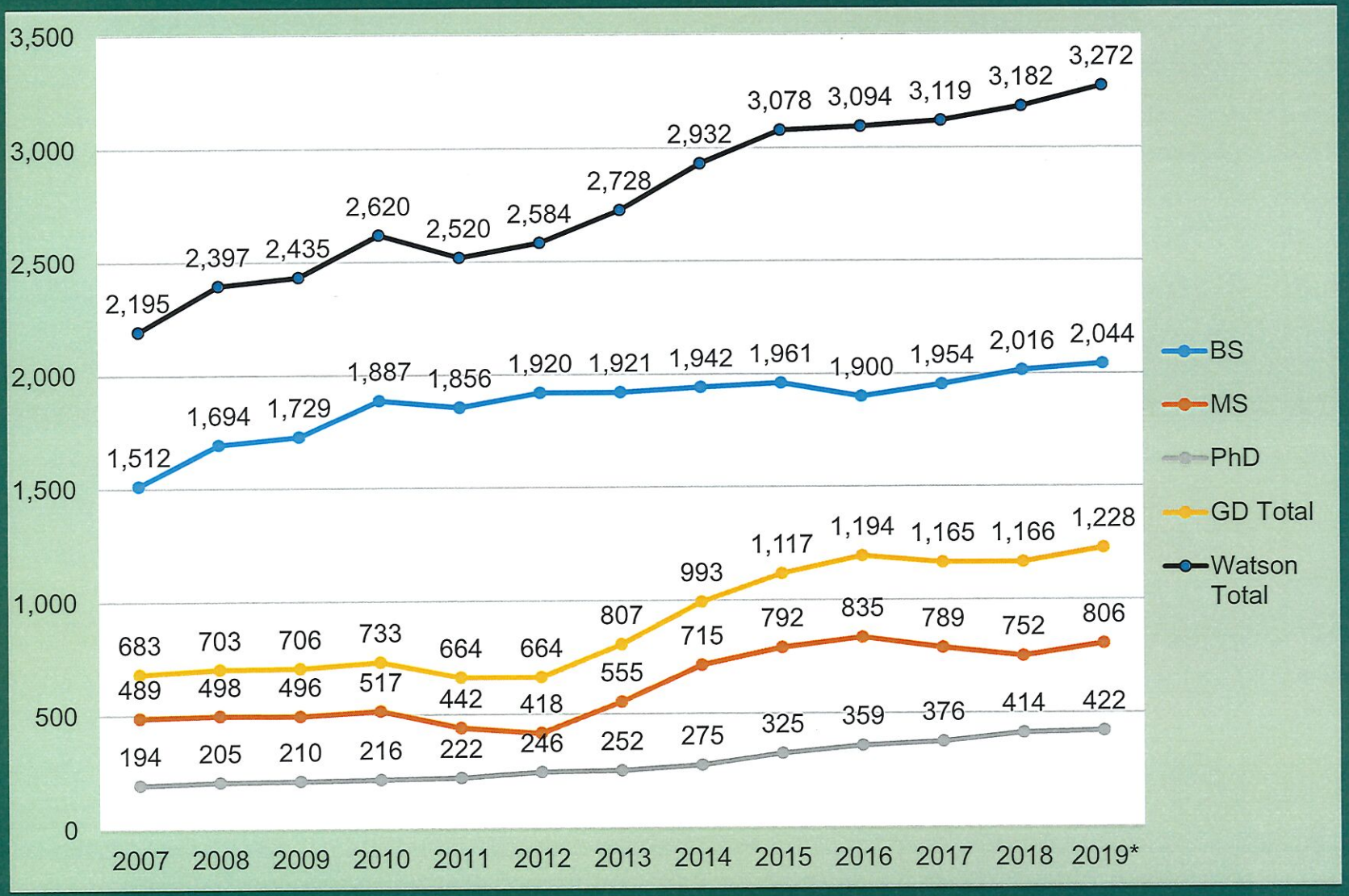
Watson School: An Overview

	Fall 2011	Fall 2019	Change	Percent Change
University	**14,746**	**17,763**	**3,017**	**20%**
UG	11,861	14,014	2,153	18%
GD	2,885	3,749	864	30%
New GD	814	1427	613	75%
Watson	**2,520**	**3,272**	**752**	**30%**
UG	1,856	2,044	188	10%
GD	664	1,228	564	85%
New GD	157	460	303	192%

- 18% of 2019 University Student Headcount (17.1% in 2011)
- 12.4% of Fall 2018 University Faculty (Headcount)

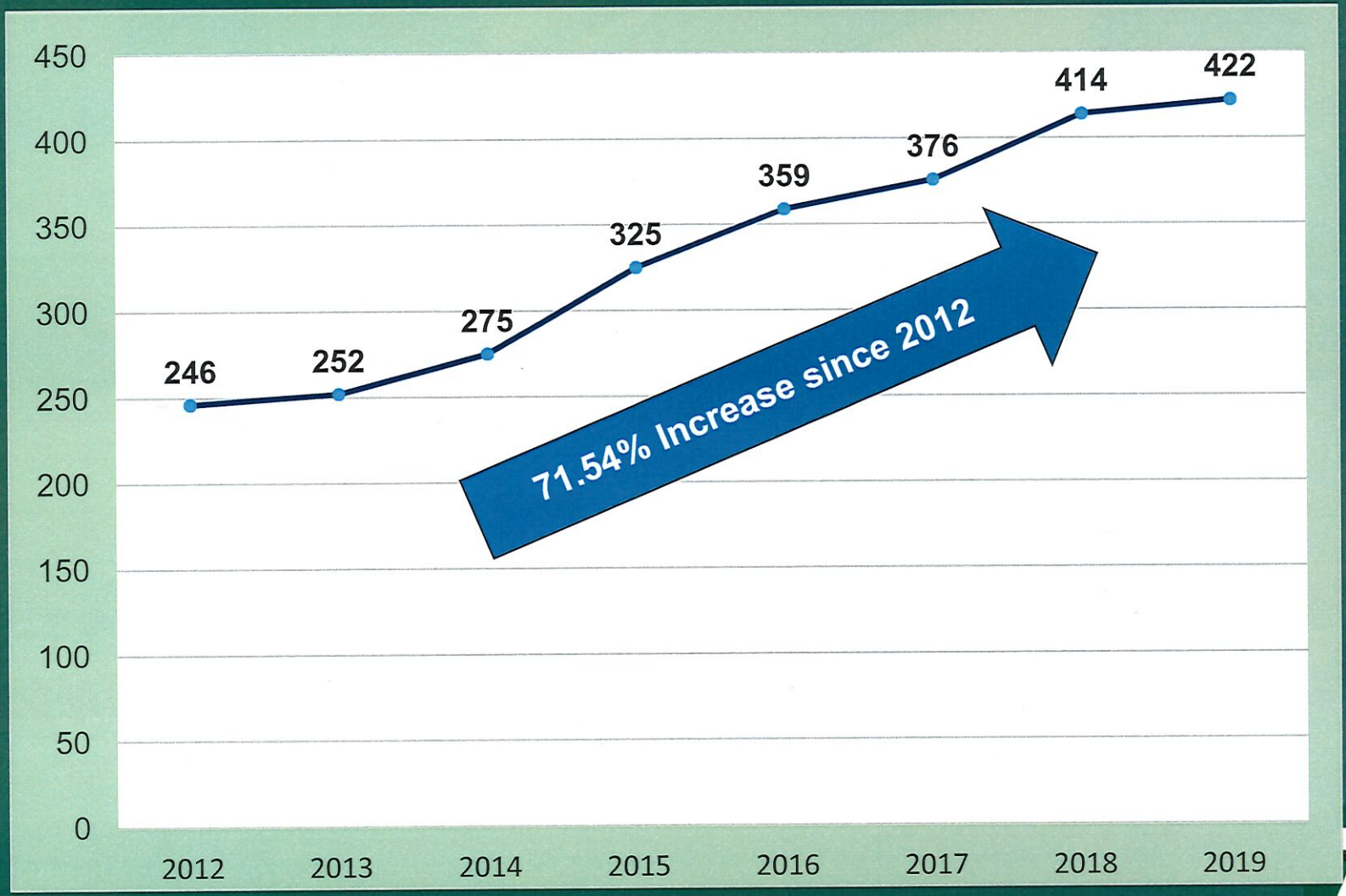
Fall 2019 Source: Office of Institutional Research & Assessment, Binghamton University, Day 45 Enrollment

Enrollment



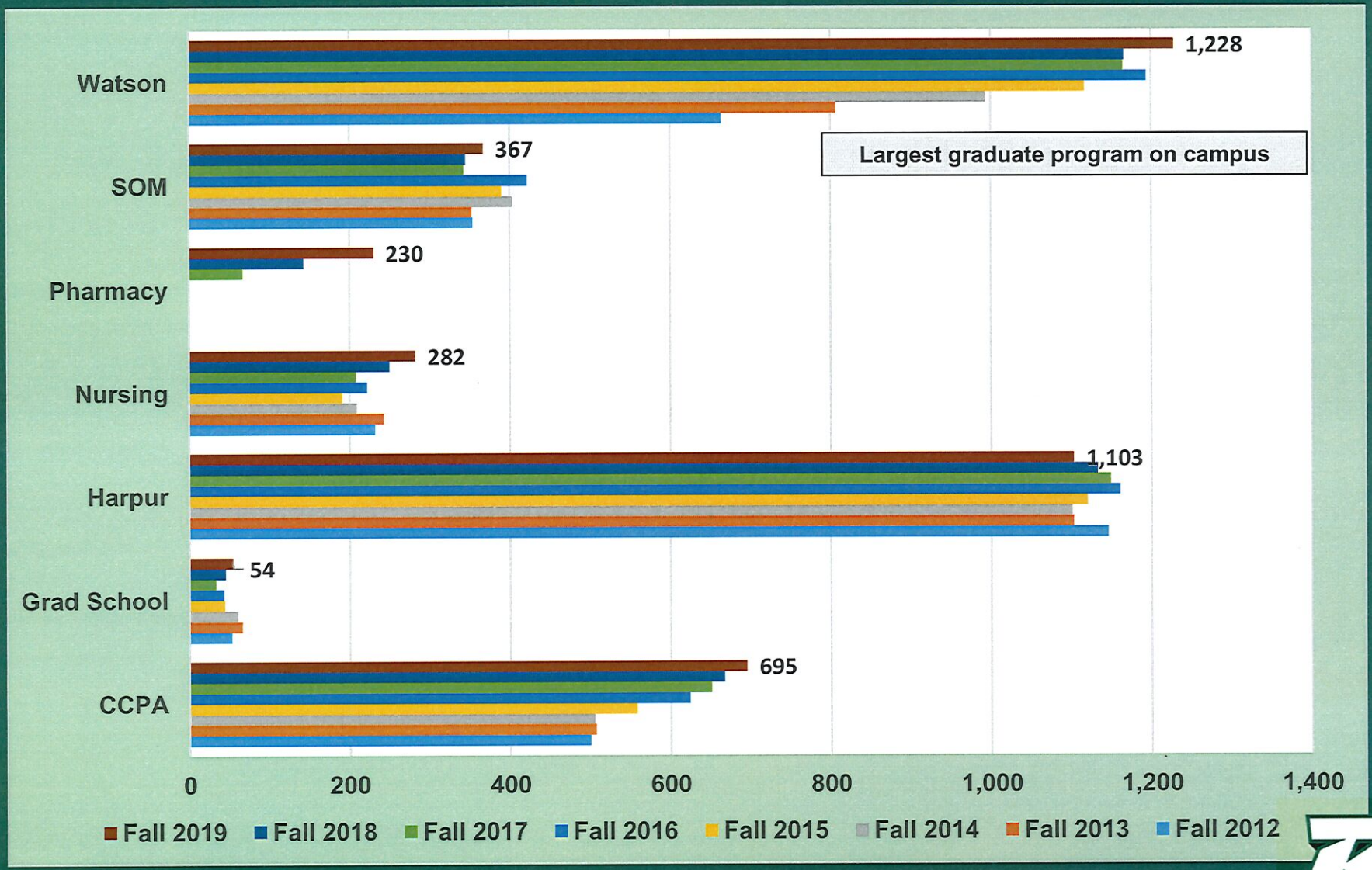
Fall 2019 Source: Office of Institutional Research & Assessment, Binghamton University, Day 45 Enrollment

Watson Enrollments - PhD



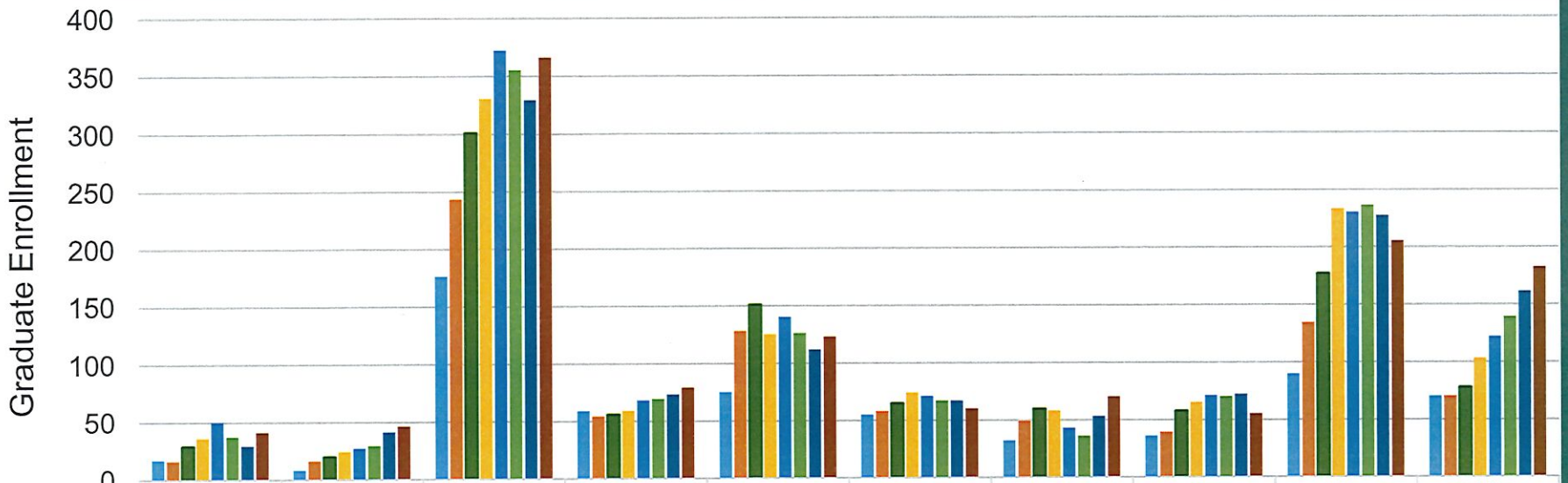
Fall 2019 Source: Office of Institutional Research & Assessment, Binghamton University, Day 45 Enrollment

GD Enrollment: 2014-2019



Fall 2019 Source: Office of Institutional Research & Assessment, Binghamton University, Day 45 Enrollment

Graduate Enrollments: 2012-2019



	BME		CS		EECE		ME		SSIE	
	MS	PHD	MS	PHD	MS	PHD	MS	PHD	MS	PHD
Fall 2012	17	8	176	59	75	55	32	36	90	70
Fall 2013	16	16	243	54	128	58	49	39	134	70
Fall 2014	29	20	301	56	151	65	60	58	177	78
Fall 2015	36	24	330	59	125	74	58	65	233	103
Fall 2016	50	27	372	68	140	71	43	71	230	122
Fall 2017	37	29	355	69	126	67	36	70	236	139
Fall 2018	29	41	329	73	112	67	53	72	227	161
Fall 2019	41	46	366	79	123	60	70	55	205	182

Fall 2012 Fall 2013 Fall 2014 Fall 2015 Fall 2016 Fall 2017 Fall 2018 Fall 2019

Fall 2019 Source: Office of Institutional Research & Assessment, Binghamton University, Day 45 Enrollment

Our New Academic Programs

- Certificate in Cybersecurity
- AI Microcredential

- Master of Science
  - Data Analytics
  - Engineering Management
  - Healthcare Systems Engineering
  - Information Systems

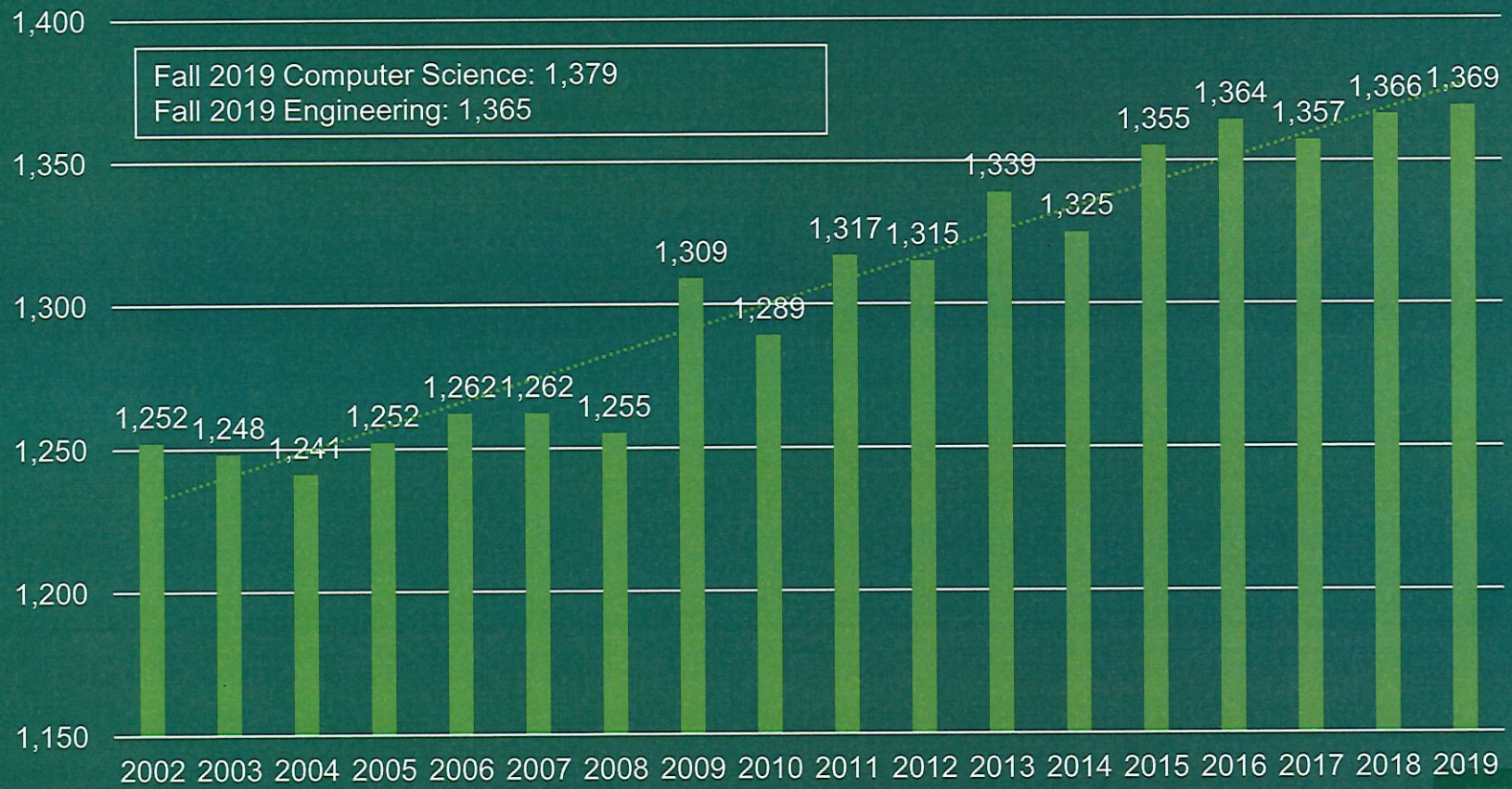
Incoming Freshmen SAT Scores Fall 2019

School or Department	Average SAT (New)	New SAT Score = Old SAT Score
Binghamton University	1,375	1,327
Watson School	1,411	1,369
Engineering	1,407	1,365
Computer Science	1,420	1,379

*Fall 2019 Source: Office of Undergraduate Admissions, Binghamton University, Unofficial: 10/31/2019

Undergraduate Programs

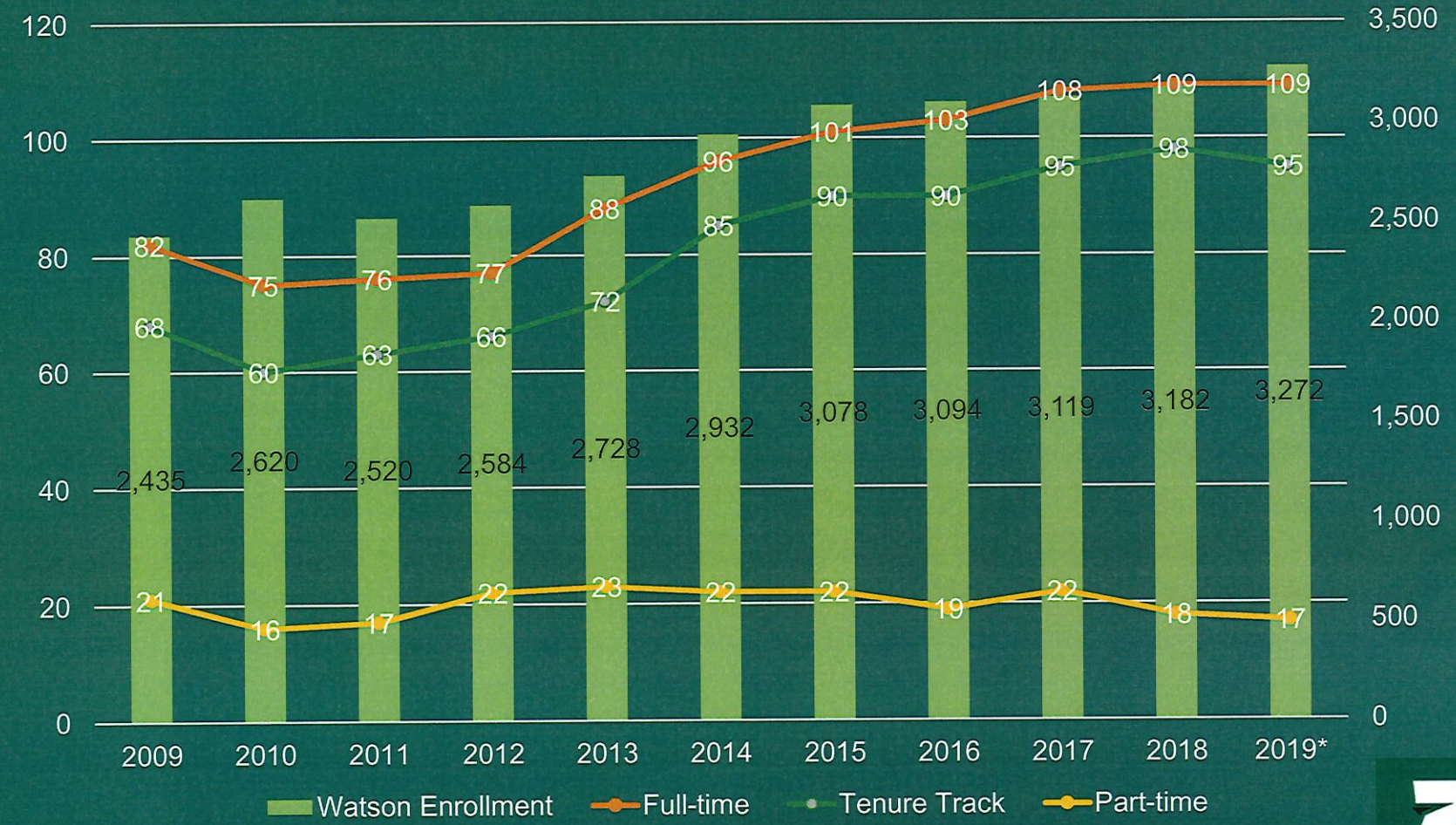
Freshmen Average SAT Scores



Source: Office of Undergraduate Admissions, Office of Institutional Research & Assessment, Binghamton University, Unofficial scores, 10/31/2019

Faculty Headcount

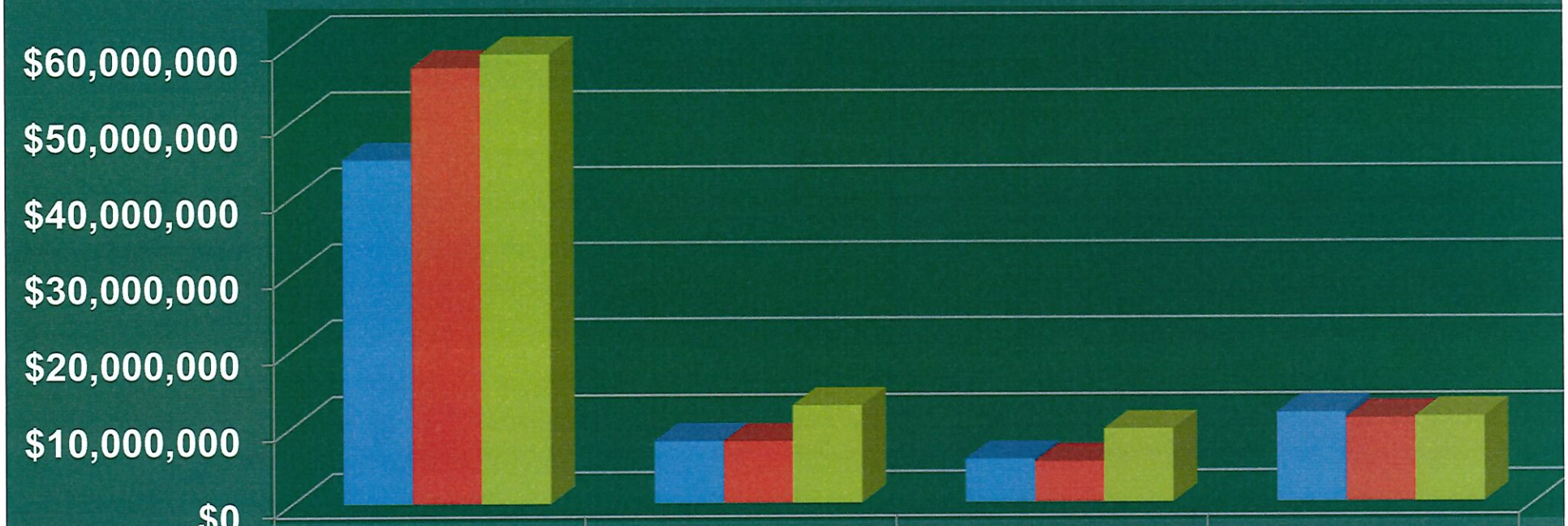
Full-Time, Part-Time and Tenure Track



Fall 2019 Source: Office of Institutional Research & Assessment, Binghamton University, Day 45 Enrollment

Research Activity

Watson School Research Activity January 2018 – 2020 (YTD)

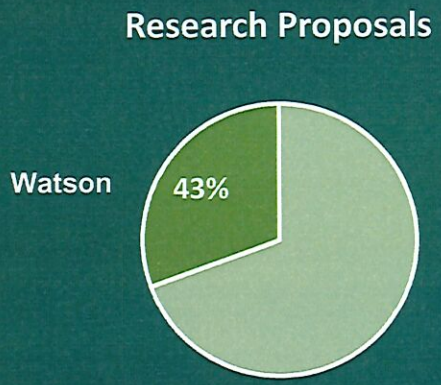


	Proposals	Committed Funds	New Awards	Expenditures
2017-18	$45,020,254	$8,063,162	$5,571,093	$11,549,330
2018-19	$57,147,988	$8,038,687	$5,258,558	$10,834,892
2019-20	$58,884,628	$12,645,774	$9,461,597	$11,013,325

Watson Research: 2018-19

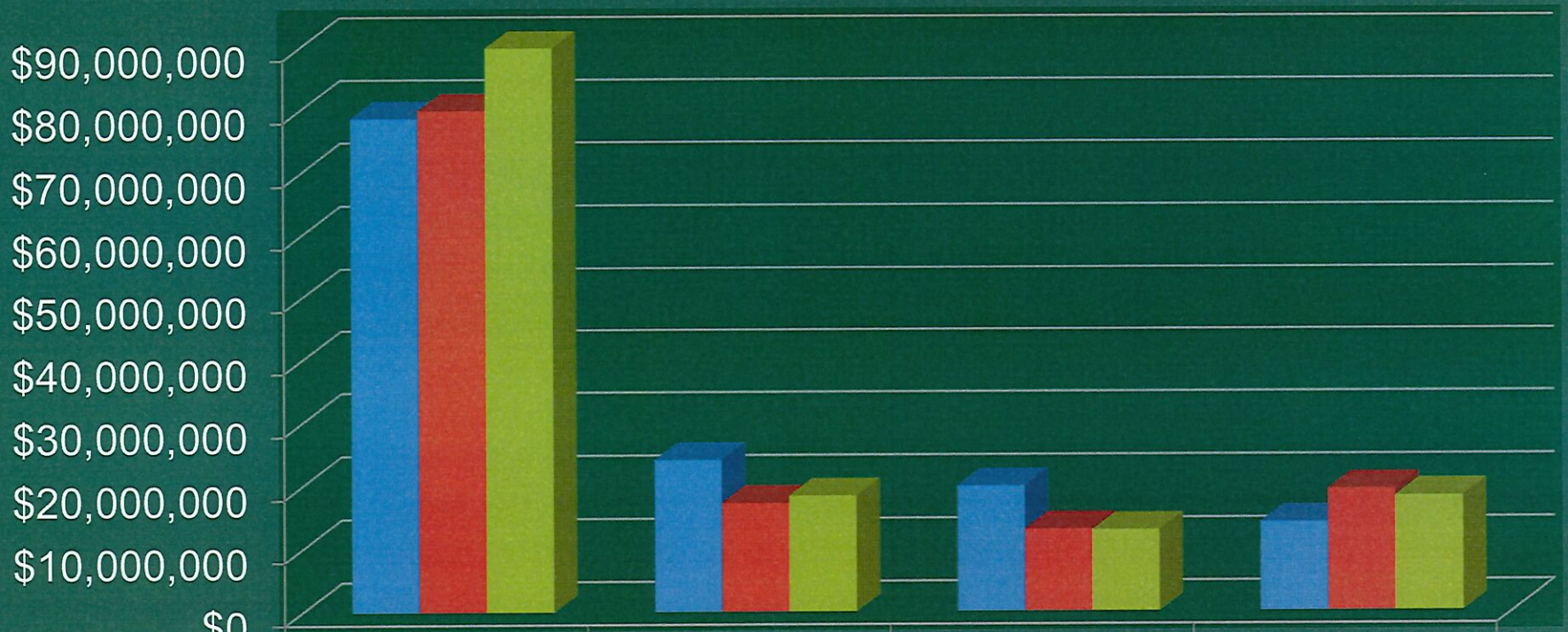
- **37.45%** of University Research Expenditures
- **$89.7** million Research Proposals Submitted
- **43%** of University Research Proposals Submitted

- Among the top ten for research expenditures
  1. **Watson Dean's Office**
  2. **Systems Science and Industrial Engineering**
  3. Psychology
  4. Chemistry
  5. **Computer Science**
  6. **Electrical and Computer Engineering**
  7. **Mechanical Engineering**
  8. Pharmaceutical Sciences
  9. Nursing
  10. Physics



Research Activity

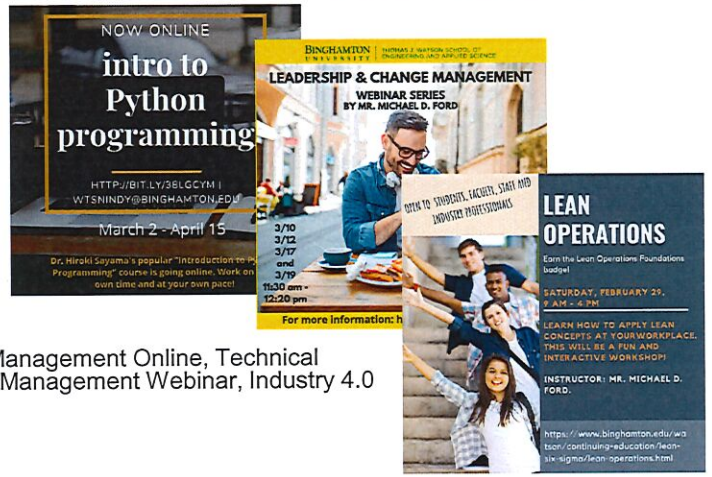
Watson School Research Activity FY2017 – FY2019



	Proposals	Committed Funds	New Awards	Expenditures
2016-17	$78,605,356	$24,061,700	$19,820,511	$14,046,428
2017-18	$79,849,416	$17,268,923	$12,997,792	$19,261,201
2018-19	$89,792,754	$18,353,799	$12,819,248	$18,183,673

Office of Industrial Outreach

BINGHAMTON UNIVERSITY | WATSON CONTINUING PROFESSIONAL EDUCATION



Engineering Professional Development

- Continuing Education Offerings (Micro-credentials awarded)
  - Design Thinking Healthcare (Piloted in Manhattan): Aug 2019,10 registrants
  - Flight Simulation Private course for U.S. Navy (Orland, FL): Sept 2019, 42 registrants
  - Introduction to Python Programming (two offerings): Sept 2019, 28 registrants
  - Probability and Statistics Online (two offerings): Sept 2019 and Jan 2020, 24 registrants
  - Finite Element Method/ANSYS Online (two offerings): Sept 2019 and Jan 2020, 5 registrants
  - Data Analytics using Excel: Oct 2019, 35 registrants
  - Artificial Intelligence & Data Science Workshop (with IBM): Oct 2019, 97 registrants
  - Emotional Intelligence Workshop: Nov 2019, 15 registrants
  - Design Thinking Workshop (1 public, 5 private in India – 502 registrants)
  - Scheduled Spring 2020: Lean Operations, Intro to Python Online, Industry 4.0 Online, Project Management Online, Technical Leadership, Supply Chain Management, Quality Management Online, Leadership and Change Management Webinar, Industry 4.0 Webinar
- Professional Engineer Offerings (PDH's awarded)
  - Project Management Live Virtual: Nov 2019, 24 registrants
  - Geometric Dimensioning & Tolerancing (Private for Penguin Computing): Feb 2020, 15 registrants
  - Scheduled Spring 2020: Engineering Ethics Live Virtual, Sustainable Engineering Design, Project Management Live Virtual
- Lean Six Sigma (BU Certifications awarded)
  - White Belt Online course 2019-2020: 381 registrants since first offered in March 2019 (48 credentials issued)
  - Yellow Belt Online: 2019-2020, 77 registrants since February 2019
  - Yellow Belt Live India: 2019-2020, 4 offerings by Mohammad Khasawneh, 225 registrants
  - Green Belt Online: May 2019, 107 registrants and Jan 2020, 145 registrants (Next offering is May 18, 2020)
  - Green Belt Live India (SVES): March 2019, 95 registrants
  - Green Belt Live for Cornell University: May 2019, 30 registrants
  - Black Belt Online course by SSIE faculty (Khasawneh, Santos, Lu, Yoon & Nagarur): 2019-20 course, 23 registrants
    - Over 100 Black Belt Certificates to Date.
  - Health Care Lean Six Sigma Online 2019/2020: 24 registrants (next offering is Sept. 2020)
    Growing interest from Healthcare providers (e.g. IHI, Executive MS – Healthcare, etc.)

NSPE-NY NEW YORK STATE SOCIETY OF PROFESSIONAL ENGINEERS

- Micro Credential Summary: 1,114 digital badges issued, socialized over 13,700 times on social media that is promoting the Binghamton University brand (Spring 2018 to date)

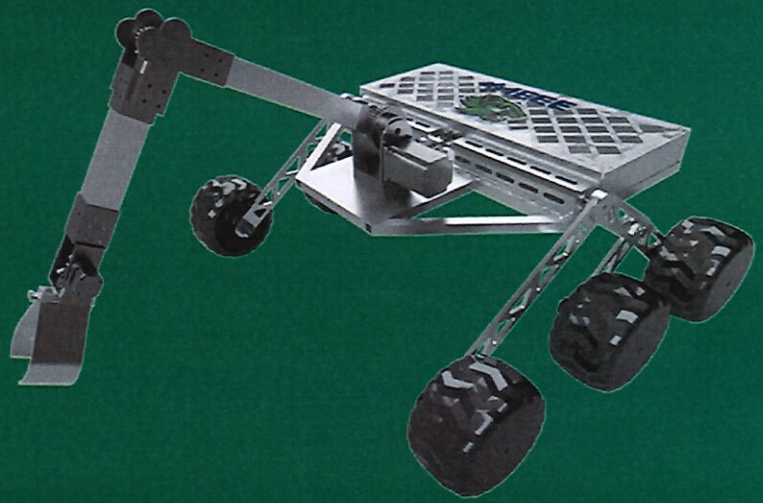
SPIR STRATEGIC PARTNERSHIP FOR INDUSTRIAL RESURGENCE

- **2019-2020 SPIR Grant ($ 411,968 allocation)**
  - 10 companies (Fall 2019)
  - 10 companies (Spring 2020)
    - 5 new – Sentient Blue Tech.,, Empire Plastics, Trinic LLC, Switched Source, Enhanced-VR, Ashlawn energy LLC

BINGHAMTON UNIVERSITY 6σ Lean Six Sigma Green Belt Healthcare

Watson Competes!

- ACM Competition Team
- ASME Student Competition Team
- Binghamton Hyperloop
- Binghamton University Mars Rover
- HackBU
- Human Powered Vehicle Challenge
- MicroMouse
- SAE Baja car
- SAE Formula Internal Combustion
- SAE Supermileage



Initiatives that help Watson reach its goal

- Graduate growth and graduate recruitment
  - Doctoral student growth
- Management of Watson's finances
- Metric-based resource management for Faculty, Staff, space, etc.

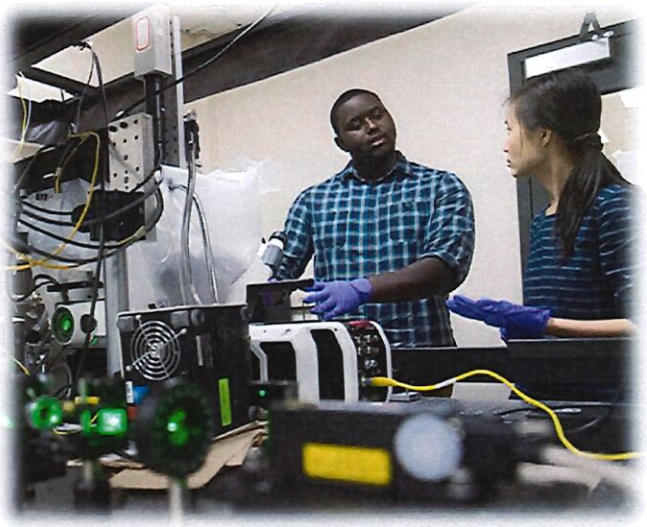
- Continuous improvement of teaching
- Enhance sponsored research and improve scholarships - funding of RPAs

Initiatives that help Watson reach its goal

- Revisiting benchmarking for departments, programs and the Watson School
- Faculty/staff retention and development
- Diversity programs and initiatives
- Internationalization and its impact
- Advancement – growth of donor base and donations
- Outreach and growth
  - Professional education courses
  - Online education offerings

What does Watson need to do?

- Continue to increase enrollment while concurrently improving quality.
- Improve laboratories (especially with teaching labs)
- Work on enhancing research and scholarly productivity.
- Hire/retain talent
- New academic programs/ options
- Strengthen current offerings



What does Watson need to do?

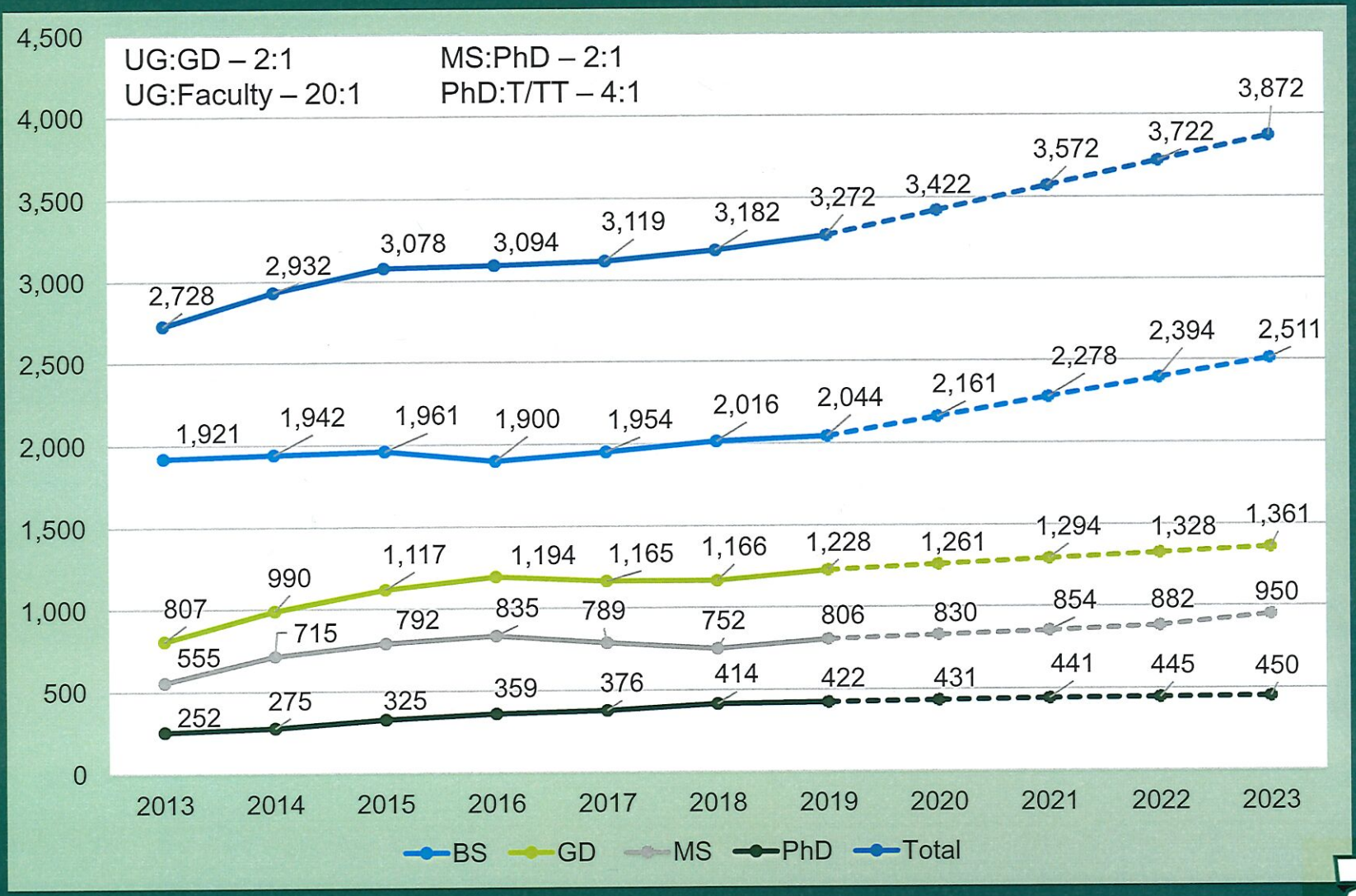
- Online presence
- Communications and Marketing
- Use benchmarking effectively.
- Continue to be financially sound.
- Improve advancement related efforts.

Growth Plans

What's next for the Watson School?

- Strategy: grow current programs with capacity; initiate, sustain and grow new programs
  - Grow enrollments – goal: 4,000 total students by fall 2023
  - Grow research expenditures – goal: $300,000/faculty member
  - New academic programs – BS, MS, PhD, certificates
  - Distance learning

Enrollment Growth – 2019 to 2023



Challenges to Growth

- Graduate Recruitment
  - Growth in applications from approximately 2,400 to 4,300; total increase of over 2,000 applications to graduate programs needed (7 applications for 1 student enrolled)
  - Need dedicated recruitment office; create an office with a Director and recruiters in country; increase monetary investment
- Research
  - Increase in faculty research funding critical to growing graduate student enrollment
  - Goal is $300,000 of funding per faculty member per year
  - Focused development on assistant professors
  - To do this, add two research development staff positions

Challenges to Growth

- Student Funding
  - Undergraduate and graduate student scholarships and fellowships to attract the best
  - Increase in research funding which leads to increased funding of students
  - Target: 2.5 to 3 RPAs per 1 T/TT faculty

- Marketing & Communications
  - Branding and marketing are critical to growth of school
  - Building reputation nationally and internationally leads to increase in rankings (critical)
  - Dedicated marketing team will support recruitment and research funding

Challenges to Growth

- Space
  - Teaching and student laboratories, including a maker space/tinker lab for students with greater access for hands-on activities is critical
  - Faculty offices and laboratories
  - Staff offices
  - Classrooms equipped with distance education technology
  - A new/additional building

THANK YOU!

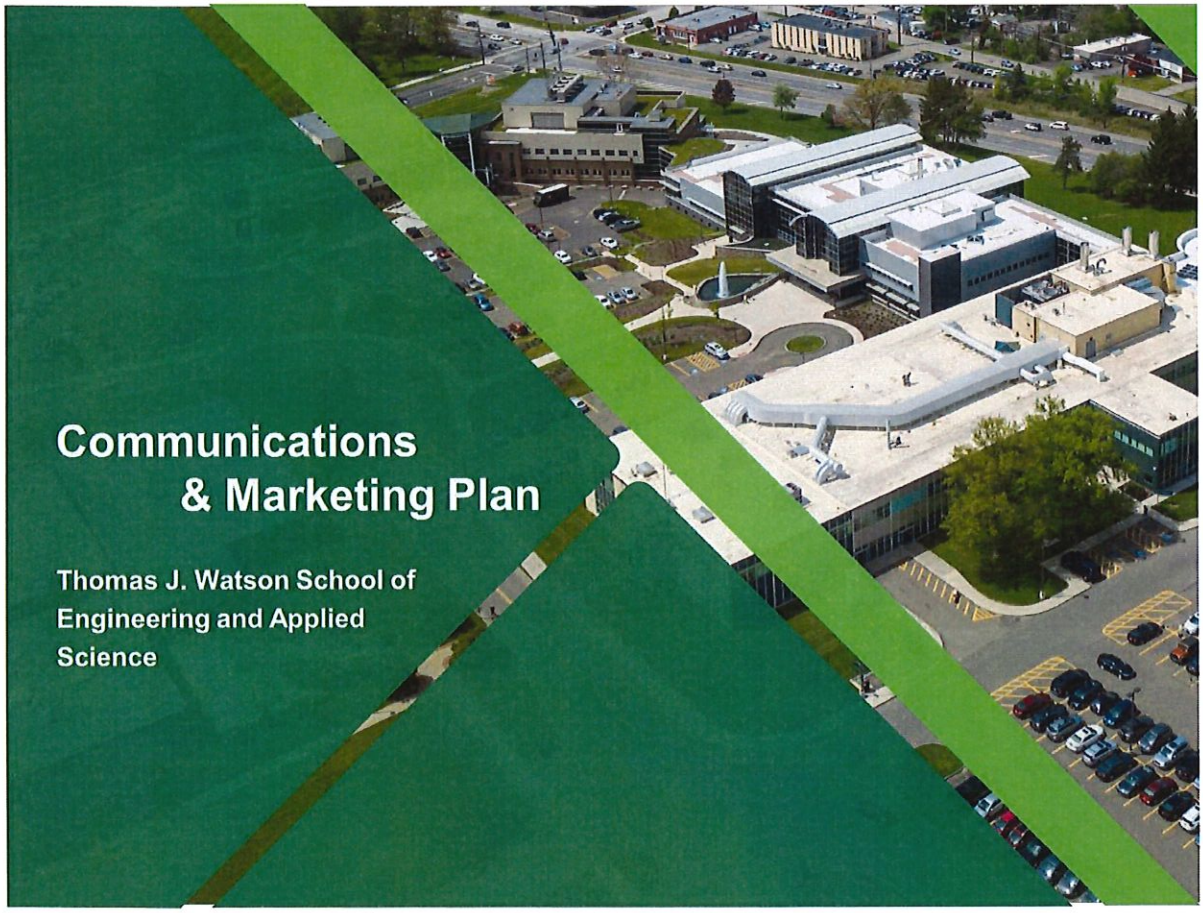
BINGHAMTON UNIVERSITY | THOMAS J. WATSON SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Appendix C

Thomas J. Watson School of Engineering & Applied Science:

Strategic Communications & Marketing Plan

Academic Year 2020-2021



Strategic Communications & Marketing Plan

In January 2019, the Watson School Communications & Marketing Committee (CMC) for 2018-2019 was requested by Dean Krishnaswami "Hari" Srihari to create a communications & marketing plan for the Watson School for 2020-2021.

- The purpose of this plan is to provide a set of goals, strategies, and measurements to increase the overall visibility of the Watson School and to enhance its reputation among both internal and external audiences.
- Success in these efforts will build enthusiasm and morale within the school community and ensure that it achieves its fundraising and student recruitment objectives.

As with any plan, this is not a static document but, rather, one that has been created to reflect the current climate and objectives that guide the school's communication and marketing endeavors.

This plan is based upon the Watson School's Communications and Marketing Plan for 2018-2019 (developed by Rachael Flores, Watson's Communications Manager), overall benchmarks, and observations/feedback provided by the Watson School's Communications & Marketing Committee.

The Communication & Marketing Committee for 2018-2019 included

1. Seokheun Choi (Chair, ECE)
2. Yan Wang (CS)
3. Pu Zhang (ME)
4. Sung Hoon Chung (SSIE)
5. George Catalano (BME)
6. Bobbi Libous (EDD)
7. Peter Partell (DO)
8. Lisa Gallagher (DO)
9. Sharon Santobuono (DO)
10. Megan Konstantakos (DO)

In November 2019, the plan was updated to include information from the 2019-2020 Communications Plan that was developed by Chris Kocher, the Watson School's current Communications Manager. The revisions are to reflect changing University and Watson goals, priorities, and activities related to communications and marketing.

Situational Analysis

In order to develop a plan for the future, it is important to understand the Watson School's greatest strengths and weakness, as well as environmental factors that will play a role in positioning Watson for the future.

Strengths • Significant growth in academic programs and research activities • Increasing visibility of the Watson School • External sponsorship growth • Watson School ranking increase (US News, Times Higher Education) • Success of press releases translating into articles • National outlets picking up stories • Sheer frequency of stories and social media posts • Watson School faculty, students and alumni	Weaknesses • Watson rankings • Suburban location of the school • Only one university-level point person for the school's communications and marketing (C&M) • C&M staff overloaded with work and not able to focus on strategic thinking • Lack of a cohesive and consistent marketing strategy • No consistent measures in place for tracking effectiveness of C&M efforts
Opportunities • Growing number of digital marketing tools available • Marketing outlets not currently utilized • Outside marketing expertise	Threats • Higher education landscape is very crowded • Ability to use some digital platforms in top recruiting markets • Reputation/brand of peers

The Watson School and its departments must be recognized for their many strengths, subsequently improving national rankings and positively differentiating the School from other engineering colleges and departments. Identifying our opportunities for success in the context of threats to success can clarify directions and choices, minimizing our weaknesses.

Target Audiences

The purpose of this strategic plan is to establish the Watson School's brand attributes in the hearts and minds of key audiences. We sought to determine and prioritize our most important and influential audiences to directly support the Watson School's vision and strategic plan.

Internal Audience

1. Individual departments
2. Faculty and staff members
3. Research fellows
4. Students, student clubs and organizations

External Audience for Marketing

1. Local community
2. Local media, print and online
3. Engineering community
4. Industry partners and employers
5. National media, print and online
6. Peer institutions
7. Other BU colleges/units

External Audience for Development

1. Watson Alumni and Friends
2. School contributors and donors
3. Scholarship donors
4. Industry partners and employers

External Audience for Faculty/Research Recruitment

1. Peer institutions
2. Engineering researchers
3. Government agencies
4. State agencies
5. Funding organizations
6. Industry partners and employers

External Audience for Student Recruitment

1. Prospects/Applicants
2. Parents
3. Children of BU Alumni
4. Engineers seeking continuing education
5. Admissions counselors
6. High School counselors
7. STEM-oriented and talented K-12 institutions
8. University Partners both domestically and internationally
9. Higher education student admissions consultants/agents

Communications and Marketing Goals

The integrated communications and marketing planning process will result in the development of four broad overarching goals:

1. **Awareness**: Increase visibility of the Watson School and its mission, core values, departments, programs, and centers. Build brand recognition for 'Watson' or 'Binghamton Engineering'.
2. **Reputation**: Strengthen the Watson School's reputation for academic, research, and service excellence. Support work done by Watson Career and Alumni Connections to foster industry connections and partnerships to benefit our students.
3. **Engagement**: Support the efforts of development, alumni affairs, and external affairs to nurture pride and attachment to the school.
4. **Recruitment**: Support the efforts of departments, admissions and academic affairs to recruit and retain high-quality students.

Strategic Plan

In order to fulfill the four goals with our target audience in mind, six key areas of focus were identified:

1. ***Build a dedicated Watson Communications & Marketing Team***: The Watson School has experienced significant growth in academic programs, research activities, students, faculty and staff over the last several years. The school has approximately 125 faculty and 50 staff members and 2,044 undergraduate and 1,228 graduate students. To date, only one university-level point person has been allocated to manage Watson's communications and marketing while workload pressures are intensifying. Even worse, frequent turnover in the position has been a real problem such as inconsistent production/strategic plans.

   Building out a dedicated communications & marketing team will improve the quality and effectiveness of communications/marketing efforts for the School.

As an initial action plan, the team can be made up of a marketing professional and graduate/undergraduate student writer, closely working with University communications liaison/manager. The marketing professional will handle internal and external communications for the Watson and be directly linked to the Dean's administration. This staff member will also develop

a strategic marketing plan and execute the approved plan.

The team's main tasks include:

- Define/develop the Watson brand, manage our reputation, and improve our ranking.
- Regularly communicate the successes and accomplishments of members of the Watson community.
- Develop effective internal communications to help our community understand/share the Watson story consistently.
- Create a robust editorial calendar for the Watson website and key publications including Watson Review, Department newsletter, the Dean's Annual Report, etc.
- Conduct an audit of Watson's communications/marketing for opportunities and efficiencies.
- Engage key audiences around priority topics and develop directional strategies.
- Define and promote best practices around critical communications priorities.
- Conduct communications/marketing and website training on a regular basis for all interested faculty and staff.
- Share external communications with an internal audience.
- Strategically advise departments on their specific communications/marketing needs.
- Assist departments with website development and creation of communications/marketing content.
- Working with the Dean's Office to collect/categorize data to be used in marketing materials and future marketing plan development (e.g. ABET reports, annual reports, faculty awards/grants, etc).
- Represent the School at prestigious international conferences (MRS, ACS, ECS, ASM, EMBC, SLAS, etc) , by supporting the efforts of our recruitment team.
- Measure and evaluate C&M plans.

2. ***Establish brand identity and implement consistent brand advertising:*** With the increase in competition, the concept of branding has worked its way into higher education. A survey conducted in 2006 by Noir sur Blanc showed that 93% of administrators in higher education already considered their institution to be a brand. But, in reality, only the larger institutions have adapted their communications policies to include the brand angle and integrated it into their strategies. A brand is what differentiates us from our competitors. It is the essence of who we are and it is our promise to our constituents. Furthermore, branding requires consistent and patient effort, as a brand can be easily damaged more quickly than it can be successfully established. Therefore, consistency of message is of upmost importance. Currently, the Watson School does not have a well-developed, consistent brand. The tactical priorities in this vital area of endeavor are:

   - Maintain and grow marketing and media support for Dean's initiatives.
   - Leverage the Binghamton Brand to the benefit of Watson.
   - Clearly define and articulate Watson's core brand values and what Watson should be known for.
   - Develop all aspects of visual identity.
   - Build unique content through active storytelling and ensure consistent compelling Watson stories to core audiences.
   - Carefully monitor the consistency of the messages.
   - Develop and establish key messages to market the School. The tentative key messages are:

     a. Excellence - At an institutional level, we will highlight the excellence of the Watson School in terms of rankings and other comparison metrics.

     b. Success - More specifically we will highlight the success of Watson students, faculty and alumni in terms of grant funding, academic competition wins and scholarship among many other things.

     c. Pride - The students, alumni, and faculty of the Watson School are a great source of pride and will be celebrated for their successes in and outside of the classroom.

     d. Teamwork/Collaboration - Members of the Watson School transcend disciplines, geography, ethnicities, genders, and so much more to come together to solve problems.

     e. Impact - We will show how research being done by the faculty, alumni, and students of the Watson School will have on society, financial institutions, the environment, and human health among many other avenues

     f. Family - Beyond engineering principals or research projects, the Watson School is filled with a diverse collection of passionate and compassionate people. The Watson

Family cares for one another and pursuits outside of engineering that inform their work inside of it.

g. Diversity – The Watson School is a place where people from all different backgrounds are welcomed and embraced.

3. ***Grow and leverage Watson's Digital presence:*** One of the most significant ways communications and marketing of higher education has changed in recent years have been in the online/digital space, using a variety of new platforms for external engagements and communications. The school must not only bring its website and social platforms up to date with current standards but also set our goals beyond the standard to truly excel in the digital space. Recently, the school and each department redeveloped their websites that can effectively house relevant, continuously updated content in order to increase viewership through search and social media. Furthermore, the School actively uses social media (e.g. Twitter, Facebook, Instagram, LinkedIn, and YouTube) to share news and information with target audiences in a faster, more relevant manner. However, Watson's Digital presence can be significantly improved further through the following tactics and measurable goals.

- Strongly encourage/support individual faculty members to develop/update their own research websites.
- Ensure all Watson School external facing communications is consistent with the Watson School brand that is being developed, from the website to digital marketing to print materials.
- Effectively optimize online content for increased search engine functionality.
- Target and increase coverage of Watson in the top 100 worldwide outlets, including key media markets in NY, the U.S., and internationally.
- Develop a social media strategy focused on strengthening reputation and engagement.
  a. Increase Instagram followers from 1,125 to 1, 500
  b. Increase Twitter followers from 150 to 300
  c. Increase Facebook followers from 30,264 to 40,000
  d. Increase the average Facebook post organic reach from 1,300 to 2,500
  e. Increase LinkedIn followers from 1,763 to 2000
  f. Develop Weibo (web-based blog)/Wechat (app-based light media) account (major social media in China) – Find a more effective way for advertising in China and India.
  g. Increase average click through rate on digital newsletters 12.77 to 15
  h. Increase prospects collected from web inquiry forms from 842 to 1,400
- Develop key metrics and analysis of successes.
- Utilize data from google analytics to inform tactics to support our strategy.

- Ensure photography and videography assets are available for trending content.
- Create a series of videos that provide awareness of the School's programs and degrees, as well as featuring our faculty, staff, students and alumni..

4. ***Support strategic recruitment:*** Continued, strategic growth of Watson's student body is critical to supporting the bottom line and maintaining the tremendous forward momentum of the past ten years. The strategic recruitment of engineering/computer science students is a shared responsibility for the entire school community. Pivotal to these efforts is the work of the Communications and Marketing Team in collaboration with the Office of Admissions, Dean's Office, and Departments. Through its communications and marketing endeavors, we seek to create understanding and action by an audience for whom Watson is perceived as the right choice for their continuing education needs. Among the most competitive areas for higher education is the international student market. Because the new government administration's increasingly stringent policies around international visas have rattled Watson's prospective students from abroad, the University and Watson have seen a decreasing number of international applicants. Although, the Watson School has seen an increase in the number of new graduate students, which can be partially ascribed to communications and marketing efforts.

(a) Undergraduate Recruitment

- Work with the Office of Admissions to develop a clear and comprehensive strategy for communicating with prospective students and admitted students.
- Work with the Office of Undergraduate Admissions and Enrollment Management to implement outreach efforts to market the Watson School.

(b) Graduate Recruitment

- Work with the Office of Graduate Recruitment, the Watson School's graduate recruitment team, ISSS, and Departments to develop a robust marketing strategy to increase graduate school applications.
- Conduct huge events/campaigns in targeted countries around the word for the next student recruitment cycle.
- Utilize professional recruiters located in targeted countries around the world.
- Advertise our degree programs to undergraduates in related disciplines.
- Showcase graduate student accomplishments and persuasive testimonials from current students and alumni.
- Showcase diversity within our program through impact stories and articles.

- Identify the percentage of graduate students receiving funding, placements of graduates, time-to-degree, and completion rates for our program.
- Help faculty, staff, students and alumni be effective recruiters.
- Ensure prospective students can connect with faculty mentors and current graduate students to speak about research and the graduate student experience.
- Invite potential students to a summer research program

(c) General endeavors

- Invest more in digital presence and digital student recruitment strategies
  a. Increase prospects collected from social media lead campaign from 226 to 500
  b. Increase prospects collected with web inquiry forms from 842 to 1,400
- Increase traffic to department graduate pages
- Create an effective Watson-wide presentation for student recruitment.

5. ***Build Fundraising Strategies:*** As the School grows, one of our major challenges will be a lack of adequate funding from the state or private resources to fund important initiatives. Communications and marketing are particularly important when it comes to securing new funding. These efforts can help to design attractive fundraising campaigns targeting audiences and other major donors. The secured funds can also be critical to develop and implement comprehensive and consistent communications and marketing plans.

- Identify funding for the communications and marketing plan to drive awareness and reputation.
- Support initiatives to build the pipeline of donors.
- Work with the Office of Advancement to ensure continued, effective communication with potential donors and alumni.
- Collaborate with the Director of Development to seek out new partnerships to develop external funding resources.
- Use the comprehensive fundraising campaign.
  a. Establish the School's fundraising message.
  b. Write and design a winning campaign brochure.
  c. Announce and publicize the campaign.
- Create an annual plan for the following fiscal year and update plan quarterly.

6. ***Expand Distance Learning:*** Online education has not only changed the landscape for distance learning but has significantly impacted higher education as a whole across the globe. A 2017 report from the Digital Learning Compass organization found that the number of students taking at least one online course has now surpassed 6 million and nearly 70% of chief academic leaders say online learning is critical to their long-term strategy. All of our MS courses should be online. However, as more online programs become available through more schools, the competition for online students increases. Successfully enrolling new online students requires schools to take a strategic approach to reaching them where they are, and to supply them with the information they need to make a decision to apply.

    - Develop our position in the market
    - Strengthen the market position
    - Prioritize audience selection and then build marketing assets accordingly
    - Develop marketing strategies that will target key audiences

Metrics

Metrics used to gauge the success of the Watson School Communications and Marketing Plan include:

- Increased number of media and marketing promotions placements, both online and offline.
- Increased number of quality students enrolling and remaining in the Watson School.
- Increased number of national scholars and high-quality undergraduate engineering students.
- Increased number of grad students.
- Increased enrollments in online courses.
- Increased donor retention and giving.
- Improved national rankings of the college.
- Increased external sponsored funding and donations.
- Creation, adoption and usage of brand guidelines.

Conclusion

The Situational Analysis, Goals, Audiences and Strategic plans described in this report will increase the national profile of Thomas J. Watson School of Engineering & Applied Science, differentiating us from other Schools at Binghamton University as well as other U.S. engineering colleges nationally and internationally. Many of the Watson School's initiatives are dependent upon a successful marketing strategy and execution of said strategy. The creation of a Watson School

marketing team who would develop a branding strategy for the school and implement many of the tactics listed in this report is vital to the school's continued growth and positive movement in the rankings.

Developed by Associate Professor Sean Choi of the Electrical and Computer Engineering Department in collaboration with the Communications and Marketing Committee. Submitted by Elizabeth Kradjian, Assistant Dean for Strategy and External Affairs.

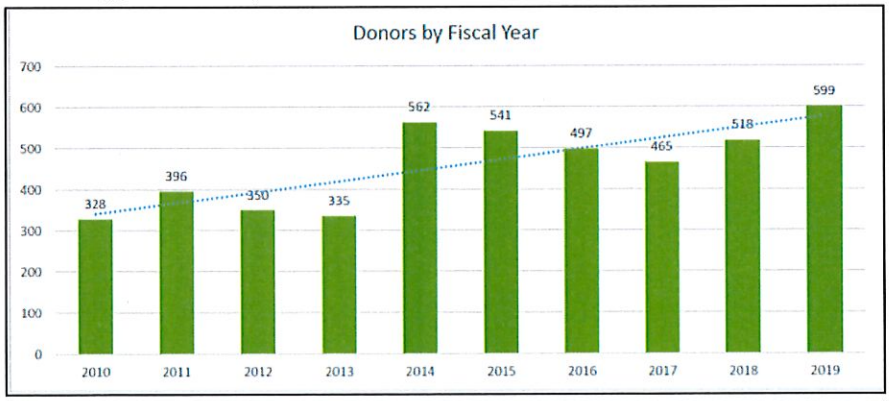
A Strategic Plan for Development

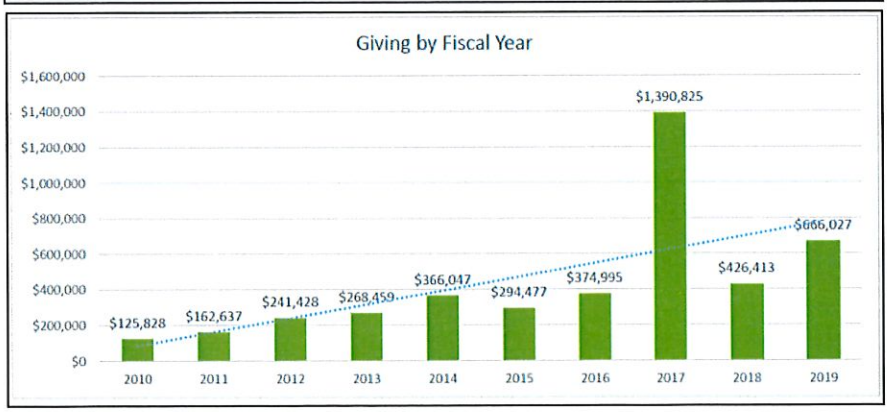
Thomas J. Watson School of Engineering and Applied Science

Over the last several years, the Watson School has enjoyed a strong financial position due primarily to the astute financial management by Dean Srihari and the Watson team. However, as we continue to grow and grow with quality, the Watson School's needs for resources to help support our excellent faculty, staff and students has become even more readily apparent. The Watson School has taken this opportunity to reevaluate its long-term development plans and has set goals that are ambitious yet realistic given the resources at our disposal.

As of November 2019, the Watson School has 16,562 alumni/associate alumni, 16,287 living Watson alumni/associate alumni, 12,929 alumni/associate alumni with email, and 15,704 alumni/associate alumni with a mailable address.

To provide some historical context, in FY2010, the Watson School had $125,828 in total donations and 328 donors. Since that time, Dean Srihari has made advancement a top priority for the Watson School. Over the past eight years and, in particular, over the last year, the Watson School has made progress towards increasing (i) the dollar amount of total donations, and (ii) the number of donors. In FY2018, the Watson School's donations have grown by over 238% since FY2010 and the number of donors by almost 60%. As one can see in the tables below, FY2019 was our best year, as both total dollars and total donors saw a significant increase over the prior year. Currently, the Watson School has approximately 16,000 alumni, with less than 4% donating to the school.





In January 2019, the goal set out for the Watson School's development program over the next five years is to grow school-based revenue from $426,413 in FY2018 to $1,100,000 annually by 2023 and to increase the number of donors from 500 in FY2018 to 875 by 2023, with a primary focus on discretionary funds for the Dean's use, while growing the major gift pool of prospects. To reach this goal, the School must grow its annual donations and number of donors by 20% and 15% respectively, beginning in the 2019-2020 fiscal year. In June 2019, the Dean of the Watson School provided a goal of dollars raised in FY20 of $1 million. Based on our performance in FY20, the goal for 2023 will need to be reevaluated.

In order to achieve these goals, our strategy is multi-faceted. First, we'll take a look at our strengths and weaknesses to help frame the strategies.

SWOT Analysis

The below SWOT analysis is focused on the Watson School and the current development organization.

Strengths • Increasing number of engaged major gift donors • Alumni connection to departments/ individual faculty • Emeritus faculty, retired staff • Faculty and staff giving • Success of alumni • Watson undergraduate and graduate students • Alumni with graduation years from 1984 to 2000 • School of Advanced Technology alumni • Success of school inspiring pride • Student organizations	Opportunities • Tax laws • Desire for alumni and friends to want to give back, honor a faculty member, etc. • Positive reputation of school among friends of the school and community members • New giving vehicles (e.g donor advised funds, etc.)
Weaknesses • Disengaged alumni base • Very small major gift prospect pool • Undeveloped donor pipeline • Age of school • Pipeline of donors	Threats • Number of not for profits competing for same pot of money • Economic health • Perception of higher education and funding (e.g. enough support comes from NY state, etc.)

• Development staffing and infrastructure • Major gift prospects reassigned • Diversity in donor sources (e.g. foundations, corporations, etc.) • Limitations placed on outreach	• Perception of how money is used by school • Donations focused on community colleges and other institutions seen as having a greater need

Goals, Strategies, Tactics and Metrics

Goal: To increase available resources for the Watson School through development.

***Strategy #1**: Increase the total number of donors to the Watson School by 15% per year.*

Currently, Watson's prospect pools are skewed towards identification and qualification. Therefore, prospect pools must be worked, and then refreshed and enhanced, while solicitation amounts must be elevated to achieve the solicitation goals.

Tactics - Building the Pipeline

- Development of prospect pool.
    - The Watson School has significant potential within existing annual, major and planned giving prospects. The greatest gains can be made with Watson alumni that are not currently engaged or contributing as donors. Significant attention must be focused on the development of Watson alumni that have graduated from our many engineering and computer science programs, as the alumni with these degrees easily transition into senior executive positions within industry.

- Grow the annual fund.
    - The Binghamton Fund for the Watson School has grown by 35% between the FY2014-15 to FY2018-2019. Since implementing a "donor choice" methodology, among other initiatives, the number of donors has increased by 18% and the amount of dollars has increased by 35% for EOY fiscal year comparison of 2017-2018 to 2018-2019. With more promotion of "donor choice", continued refinement of the school's message and cultivation of high-end annual fund prospects should continue to improve annual fund performance.

- Leverage Watson Student Organizations to engage alumni and new donors.
    - Our vibrant student organizations and student competition teams gain great interest from alumni and corporate donors. In working with these organizations on their

efforts and educating our external constituents about their achievements, we have the opportunity to connect with potential donors around an activity that resonates with them, in addition to providing support for these invaluable student experiences. In FY 2018, we created a *Watson Competes!* fund to provide a central resource for all of our competition teams. Donors can currently provide funds for a specific organization or donate to the central fund. We believe this engagement around our student organizations will help to build the pipeline of donors.

- Enlarge the prospect pipeline, particularly at the major gift level, by having the development officer work closely with the Career and Alumni Connections office to enhance prospect identification, cultivation, and stewardship.
- Capitalize on the networks of already engaged alumni and donors.
- Develop a robust marketing and communications plan for development.

Metrics

- Total number of donors giving to the Watson School. (FY19 599; increase 15% per year)
- Number of new donors giving to the Watson School.
- Number of new donors at the presidential and leadership levels.

Strategy #2: *Improve the quality of data on Watson School alumni.*

Tactics

- Invest in a review and update of all Watson School alumni contact information.
- Invest in a wealth screening of the current Watson School alumni database.
- Review all international alumni for accuracy of information.

Metrics

- Number of alumni with email addresses in database. (currently, 12,929)
- Decrease in number of returned mailings/bounced back email addresses.
- Increase in number of alumni with accurate job information and capacity ratings.

Strategy #3: *Increase Watson School staffing and infrastructure for development efforts.*

Tactics

- Hire two dedicated development associates for pipeline development (engagement and qualification).
- Hire a development team member who would be responsible for communications to alumni and donors, including marketing efforts.

Metrics

- Increase in number of qualified alumni.

- Increase in stewardship activities.
- Increase in engaged alumni.
- Increase in number of donations and amount of donations.

Strategy #4: *Increase the total amount of dollars raised through development efforts by 20% per year.*

Tactics

- Improve awareness amongst alumni of giving options (e.g. stock donations, planned giving, endowments, etc.). Promote planned giving options and stock donations.
- Increase amount of time spent meeting with and soliciting donors.
- Utilize current donors/engaged alumni in development efforts.
    - **Volunteer Leadership:** In the 2018 calendar year, the Watson School created and recruited senior alumni to the New York Metro Advisory Board. The board currently has 14 alumni, primarily from the financial services and construction sectors. In addition, the Watson School also has a local advisory board for the school and one for each of the six academic departments. There is significant potential to leverage these individuals to help the Watson School achieve its funding priorities by improving our interactions with industry (large and small companies).
- Leverage corporate relationships for sponsorship.

Metrics

- Total amount of dollars raised through development efforts. (FY19 $666,027; increase 20% per year)
- Total dollars raised from corporate sponsors.

Current projects/initiatives

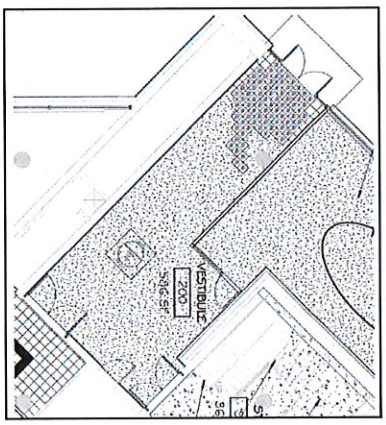
Engineering Renovation Project:

Beginning in 2019, a major renovation of the Engineering Building will begin. Binghamton University has committed over $14,000,000 to the project with an additional funding of over $4,000,000 to renovate the existing labs and other areas on the ground floor. This major capital improvement to the Watson School facilities, will greatly enhance the academic environment for our students and help to attract and retain the best faculty and students to the Binghamton campus. The renovation of the Engineering Building will create many naming and sponsorship opportunities for our current and potential alumni donors and corporate supporters. Not only does it have a prime physical location on campus, but there is also a strong connection between the

building and many of our alumni, who have memories of spending time in the Engineering Building during their time on campus. The renovated senior design laboratories and competition team shops will be of great interest to our current and potential corporate partners, who are consistently impressed by the caliber of our students. Our student services offices also present wonderful opportunities for organizations to have their name appear prominently to students they hope to recruit at the conclusion of their academic career (including the Watson Advising Office, the Office of Watson Career & Alumni Connections and the Office of Diversity Programs and Initiatives – all of these offices will be located in close proximity for the first time).

Brick Campaign:

The brick campaign is a new program to help raise unrestricted funding to be used at the Dean's discretion. It is an opportunity for a potential donor to leave a lasting legacy at Binghamton University by putting their name, a dedication or a message of significance on a brick. This program will be marketed to the over 15,000 alumni of the Watson School, the many companies that recruit our graduates, parents of our current students, friends of the school (including advisory board members), and current donors. An initiative such as the Brick Campaign is important in increasing the number of donors to the Watson School and in building a pipeline of donors who have the potential to be major gift donors.



Sample floor plan of entrance to the 1st floor of the Engineering Building showing brick placement.

The prime location of the Engineering Building on the University's campus will be a major selling point to donors, in addition to the high traffic area where the bricks will be placed.

Goldblatt Challenge:

The Goldblatt Challenge is an initiative aimed at increasing the giving rate of Watson School faculty, staff and retirees over four years. Mr. Ken Goldblatt '87 is providing a match every year we hit our target participation rate. Over the last two years, the giving rate has increased from 9% to 25%. We are currently in year 3 of the initiative with a goal of 30% participation. This is another initiative that increases the number of donors to the Watson School. It can also be leveraged as a giving challenge to alumni.

Planned Giving:

Mr. Alan Greene '88, Watson's Director of Development, is creating focused messaging to promote planned giving opportunities to our alumni, friends, current faculty and staff and retired faculty and staff. Currently, our campus does not have a major gifts officer that focuses on planned giving. We believe there could be great interest from our alumni in some of these options.

Summary

The Watson School is at a point in its maturity where investment in the school's development program will determine future resource generation and its ability to compete with the best universities in the world. It is vital that a pipeline of engaged alumni be created to grow donations at the presidential, leadership and major gift level. Development dollars raised are critical to the growth of the school and the ability to provide the best academic and research environment for its students, faculty and staff.

The below chart shows the growth of the Watson School's development program over the next five years based on 20% growth in total dollars raised and 15% growth in total donors.

Fiscal Year	Total dollars	Total donors
2020	$1,000,000	689
2021	$1,200,000	792
2022	$1,440,000	911
2023	$1,728,000	1,048
2024	$2,073,600	1,205

In order to achieve the above goals, it will be important to build a development team that can actively engage the school's alumni in a strategic way to build a pipeline of donors that will feed into the higher category of donors (e.g. presidential, leadership, major gifts). Many of our alumni have not been engaged/contacted since they left our campus. Including two development associates or assistants that can engage previously lost alumni or reengage alumni is extremely time consuming and yet extremely critical to the growth in the number of donors giving to the Watson School. That team will need the support of the marketing team to ensure our outreach is effective and efficient and alumni are connecting with the Watson brand; that we have a consistent outreach plan and are utilizing all of the available tools, including digital marketing. Providing alumni with a consistent reason to support our faculty, staff and students is important. The perception that our school receives enough funding from the state or that we are not in need of resources outside of our annual budget is a threat we need to combat. New giving vehicles, beneficial tax laws, the desire for alumni and friends to want to give but not knowing the many ways one can, and the positive reputation of the school among friends and community members are all opportunities we should take advantage of.

Submitted by Elizabeth Kradjian, Assistant Dean for Strategy and External Affairs, in collaboration with Alan Greene, Director of Development.

Thomas J. Watson School of Engineering and Applied Science

On-line Learning: A Strategic Plan

The Landscape

In the latest report from the Education Department's National Center for Education Statistics, in fall 2017, of the approximately 20.1 million students enrolled at Title IV institutions, approximately 17.1 million were undergraduates, and approximately 3.0 million were enrolled as graduate students. Of the 17.1 million undergraduate students, 63% were enrolled in 4-year institutions, 35% in 2-year institutions, and 2% in less-than-2-year institutions.

Approximately 49% of the 1.3 million students enrolled at private for-profit institutions were enrolled exclusively in distance education courses, as were 19% of the 4.1 million students enrolled at private nonprofit institutions and 11% of the 14.7 million students enrolled at public institutions. (see appendix A)

The proportion of all students who were enrolled exclusively on-line grew to 15.4% (up from 14.7% in 2016). The share of all students who mixed on-line and in-person courses grew slightly faster, to 17.6% in 2017 from 16.4% in 2016. And the proportion of all students who took at least one course on-line grew to 33.1%, from 31.1% in 2016.

As stated by Doug Lederman in his article *Online Education Ascends,* "[the data] represents a steady march in the normalization of online learning, as the proportion of all enrolled students who had studied online stood under a quarter in 2012. But while fans of online learning are likely to be heartened by that slow but sure rise in acceptance, the pure increase in online enrollments -- at a time of overall dips in postsecondary attendance -- may be just as noteworthy."

Distance Education Providers

In 2018, 20 million new learners signed up for at least one MOOC, down from 23 million the year before. Despite the slowdown, the number of paying users may have increased. MOOC providers' constantly changing their offerings seems to be resonating with the student, given providers such as Coursera are hitting record revenues ($140 million in 2018 for Coursera).

The top five MOOC providers include (by user):

1. Coursera — 37 million
2. edX — 18 million
3. XuetangX — 14 million (world's first Chinese MOOC platform, authorized to operate edX courses in the Chinese mainland)
4. Udacity — 10 million
5. FutureLearn — 8.7 million

In 2018, many universities, including the University of Pennsylvania, UC San Diego, and Imperial College London started offering on-line degrees through a MOOC, also known as MOOC-based degrees. Others — such as Georgia Tech and the University of Illinois — announced additions to their existing on-line degree offerings.

Coursera launched a new type of Microcredential called MasterTrack, which is a more expensive version of edX's MicroMasters. MicroMasters programs are series of graduate level courses that one takes to earn credentials in a specific career field, advertising themselves as a way to bridge the gap between your education and skills needed in the workplace. They are also marketed as a steppingstone to a full Master's degree.

In addition, there are large on-line programs through not for profit and for profit universities, including University of Southern New Hampshire, Penn State Global and Arizona State University On-line. Southern New Hampshire University is a private, nonprofit, accredited institution with more than 3,000 on campus students and over 90,000 on-line students, making it one of the fastest growing universities in the nation. ASU recently launched a for-profit venture to promote its on-line program to big employers; programs similar to the ones they have with Starbucks and Uber.

The Watson School

The mission of the Watson School is to provide education and research in the broad field of engineering and applied science (watson.binghamton.edu). To fulfill this mission, the School will:

- offer baccalaureate, master's and doctoral programs that prepare graduates for employment in the technical professions and combine
  - a firm grounding in fundamentals,
  - elements of practical application and
  - an appreciation for liberal learning.
- conduct basic and applied research which expands the technical knowledge base and advances industrial practice.
- provide support for the economic development of the State of New York.
- ensure that its programs are accessible to the widest possible range of individuals and institutions.
- work with industry and community partners, foster participation and representation from traditionally underrepresented groups in technical research and education.
- support the profession of engineering through continuing education opportunities for practicing professionals.

To support this mission, the use of on-line delivery methods for courses and programs will support the accessibility of the school's programs and our work with industry and community partners, in addition to supporting the profession of engineering.

The State University of New York's Open SUNY is a SUNY-wide collaboration is a seamless way for students to access courses and degrees wherever and whenever the student wants. Very

simplistically it is a platform through which SUNY campuses and list their on-line opportunities. It also provides student support, which is very important to the distance learner. Open SUNY's vision is to provide students with the nation's leading on-line learning experience. (open.suny.edu) Open SUNY draws on the Power of SUNY and supports campuses and faculty to:

- Dramatically expand access to higher education.
- Raise completion rates.
- Prepare students for success in their lives and careers, and contribute to the economic success of New York State and beyond.

Their mission is to lead the SUNY System in the advancement of on-line learning at both the campus and system level with primary emphasis on the Completion Agenda by:

- Providing exemplary models for on-line program development and campus provided services.
- Delivering high quality, cost-effective services to support campus on-line learning operations.
- Advocating for SUNY-wide policy, infrastructure, and resources in support of online learning.
- Promoting and engaging in research and innovation in on-line learning.

Utilizing the power of Open SUNY is an opportunity that may benefit the growth of our on-line courses and programs. Currently, several Watson courses are available through Open SUNY including offerings for summer 2019, fall 2019 and winter 2019-20. The preponderance of the fall 2019 courses are those enabled by EngiNet.

Where we are

The Watson School has a long history of providing courses and programs delivered via distance education. The EngiNet office in the Watson School has been enabling the delivery of our courses and programs via distance learning for over 30 years. EngiNet was at the forefront of distance delivery of courses on our campus and remains the only school based provider.

Currently, the Watson School is ranked as tied in the #72 - #94 group by U.S. News & World "Best Online Engineering Master's Programs" rankings. This ranking is based on information submitted about our MS in ISE and MS in Systems Science programs. The two schools listed as ranked lower than 94, were "unranked" because they reported an enrollment of less than 10 students. The factors used for this ranking are listed as the following:

- **Engagement (25 percent):** Quality online engineering programs promote participation in courses, allowing students opportunities to readily interact with their instructors and classmates, as is possible in a campus-based setting. In turn, instructors are not only accessible and responsive, but they are also tasked with helping to create an experience

rewarding enough that students stay enrolled and complete their degrees in a reasonable amount of time.

- **Faculty Credentials and Training (25 percent):** Strong online programs employ instructors with academic credentials that mirror those of instructors for campus-based programs, and they have the resources to train these instructors to teach distance learners.

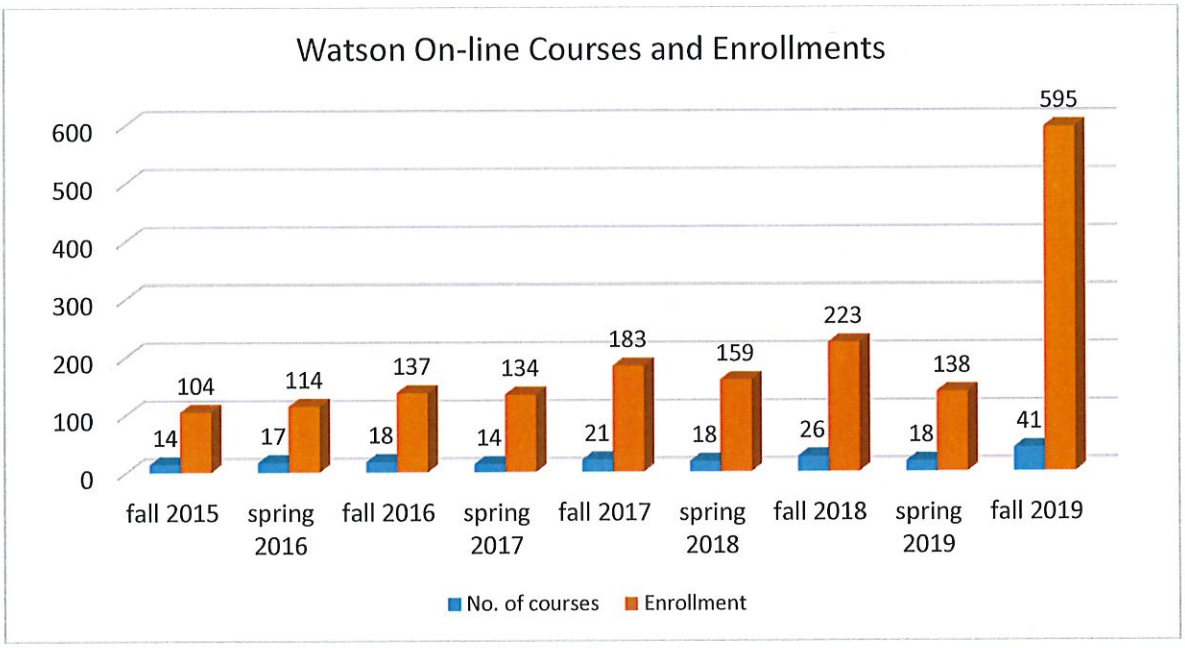
- **Expert Opinion (25 percent):** A survey of high-ranking academic officials in engineering helps account for intangible factors affecting program quality that statistics do not capture. Also, employers may hold in high regard degrees from programs that academics respect.

- **Services and Technologies (12.5 percent):** Programs that incorporate diverse online learning technologies allow greater flexibility for students to take classes and labs from a distance. Outside of classes, strong support structures provide learning assistance, career guidance and financial aid resources commensurate with quality campus-based programs.

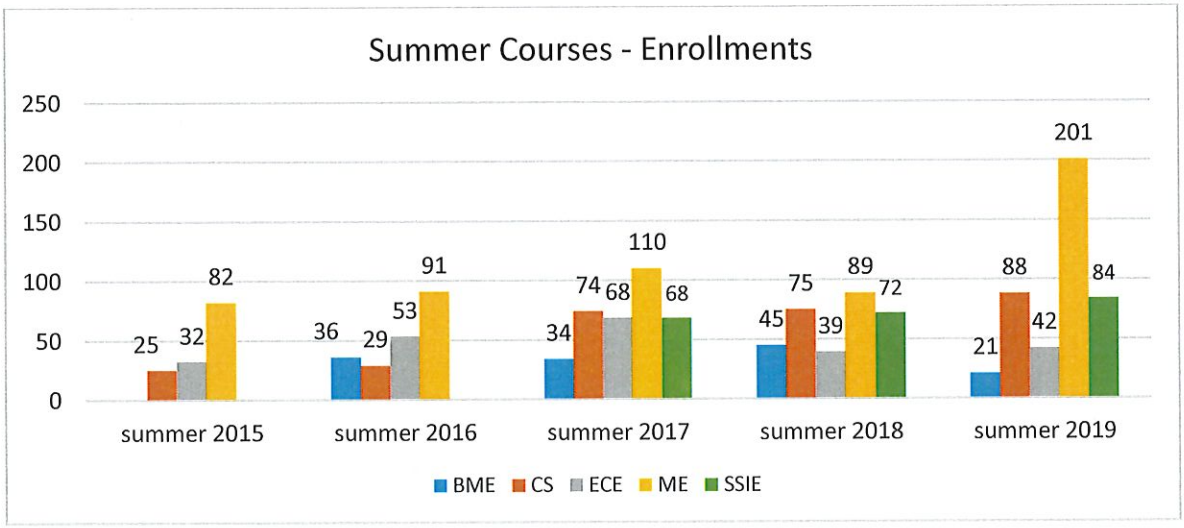
- **Student Excellence (12.5 percent):** Student bodies entering with proven aptitudes, ambitions and accomplishments can handle the demands of rigorous coursework. Furthermore, online degrees that schools award judiciously will have greater legitimacy in the job market.

Distance learning courses are indicated in the schedule of classes on BU Brain with an Instructional Method of Online Asynchronous (OA), Online Synchronous (OS), Online Combined (OC), or Online Hybrid (OH). Online Asynchronous courses are those in which the instruction is recorded/stored and then accessed by the students at another time. Online Synchronous courses are those in which students are at locations remote from the instructor and viewing the instruction as it occurs. Online Combined courses are those in which there is a combination of asynchronous and synchronous instruction that occurs over the length of the course. Online Hybrid courses are those in which there is both in-person and online (asynchronous and/or synchronous) instruction that occurs over the length of the course. Most of courses offered through Watson are either OA (EngiNet) or OH. For the OH courses, it can be difficult to know which students are completely on-line students.

As shown in the chart below, the Watson School's offerings to distance learners has increased since fall 2015, with the largest increase in fall 2019. This large increase is due to the Electrical and Computer Engineering Department making the preponderance of their graduate level courses available on-line – going from 5 on-line courses in fall 2018 offered by the ECE Department to 24 offered in fall 2019. The enrollment numbers below are slightly inflated for OH courses, as in-class students and on-line students are grouped together.



Summer semester on-line courses are also a large part of our on-line offerings and generate revenue for the departments. In summer 2019, 26 courses were taught across 5 departments.



Due to the registration of our on-line programs with SUNY (which is currently underway for graduate programs in SSIE and ECE), we have not developed nor implemented a strategic marketing campaign of our on-line programs. In a quick google search for online Masters in Healthcare Systems and online Masters in Cybersecurity, the results are quite striking. For the Masters in Healthcare Systems, the top search results show that our program is distinct from others and the market is not saturated with competing programs. In contrast, the large number of Masters

in Cybersecurity programs is clear. It includes online programs offered by two powerhouses in the online provider space, Purdue University Global and Penn State World Campus.

The Watson School has a strong presence in the continuing education for professionals market, as offered through our Office of Industrial Outreach and led by Mr. Mike Testani. They continue to offer live classes, as well as several virtual or on-line classes, offering microcredentials (non-credit) for many of them. Currently, they are testing a "live-virtual" model for a course in which the instructor is teaching on-line in real time. This approach was very well received by the Watson Continuing Professional Education advisory board. Below is a list of the on-line courses offered in 2019 through our Office of Industrial Outreach.

Watson Continuing Professional Education
2019 online course enrollment

Online courses	# Enrollees	# Offerings
LSS White Belt	308	continuous
LSS Green Belt	237	2
LSS Green Belt Healthcare	49	2
LSS Yellow Belt	39	3
LSS Black Belt	23	1
Intro to Prob & Stats	25	3
Advanced Prob & Stats*	5	1
Intro to FEM	11	2
FEM using ANSYS	11	2
Project Management*	23	1
Total online	**731**	**17**

*New in Fall 2019

The Office of Industrial Outreach is continually adding to this portfolio of on-line offerings. The additional offerings will be focused around key competency areas (as informed by our Industrial Advisory Board), including cybersecurity and data science. The growth of these courses is directly tied to the participation of Watson School faculty in on-line not-for-credit continuing education offerings.

SWOT Analysis

The below SWOT analysis is focused on the Watson School and its current standing in the on-line programs market.

Strengths	Opportunities
• A strong Watson brand • History of delivering courses via distance education • Unique programs • Faculty expertise • EngiNet model • Cost of on-line degrees (compared to other non-profit institutions)	• Relationship with industry • Watson School alumni • Unique programs that are attractive to professionals • Microcredentials • Students can begin program before coming to campus or take bridge courses • Lifelong learning needs (employees living and working longer) • Advancing technology requires reskilling over one's career • The Power of SUNY – market for programs
Weaknesses	Threats
• Programs not registered for on-line via SUNY • Buy-in from some departments/faculty • Brand awareness • Delivery methods and schedule of on-line programs • Support for faculty • Support for students • Cost of on-line degrees (compared to MOOCs) • Courses with lab requirements • Localized faculty expertise with online learning delivery • Limited, if any, synchronous online offerings • Limited facilities and enabling technology (e.g. 2 EngiNet classrooms) • Limited faculty enablement/training opportunities (esp. for instructional and curriculum design) • Very limited market analysis for new programs and potential markets	• MOOCs • Competing programs at non-profit institutions • Competing programs at for profit institutions (degree programs) • SUNY and University support/infrastructure/policies • Administrative barriers (e.g. proctoring exams, support staff, etc.) • Private, for-profit, and on-line universities' responsiveness to program and student scheduling demands

• Faculty not investing the time to make course ideal for on-line learner, if not a hybrid course • A dedicated staff or faculty member to direct on-line education in the Watson School.	

Goals, Strategies and Tactics

Online education allows the Watson School to expand its portfolio of offerings that can broaden the geographic reach of our school beyond the brick and mortar that constrains our ability to reach new students in new markets. Increased and convenient access to higher education, regardless of where students may live or their family or work obligations, helps to create a strong workforce and to attract businesses that provide high-skill, high-wage jobs that drive today's economy. In addition, the student of today is looking for the ability to gain new skills on-demand and in a manner that is convenient for them and at a time that is convenient for them. By not examining our approach to on-line learning, we are missing an opportunity to enhance our ability to reach the student where he or she is in a method in which they would like to receive their education. Students need flexibility, particularly at the graduate level.

Current programs: Masters in ISE, Masters in Systems Science, Masters in Healthcare Systems Engineering, Masters in Electrical and Computer Engineering, PhD in ISE, PhD in Systems Science; in addition to several not-for-credit courses.

Potential programs: Microcredential in AI (CS), Certificate in Cybersecurity, graduate programs in other Watson departments

Goal: To grow our enrollments of our graduate programs through distance education.

Strategy #1: *Increase the number of required and elective graduate courses for Watson School programs available through distance education.*

Tactics:

1. Incentivize faculty to develop courses for on-line delivery and focused on the distance learner.
2. Develop opportunities for faculty on-line enablement/training activities.
3. Explore ways to offer synchronous on-line offerings; in addition to offering courses that are not based on the traditional semester.
4. Invest in new technology in consultation with faculty to ensure a variety of teaching styles can be accommodated.
5. Hire department specific professors of practice to assist faculty with instructional design and best practices for on-line courses.

6. Provide administrative support to faculty for increase in student enrollments (e.g. TA support).
7. Explore possibility of offering courses off-cycle from the university academic calendar; enable students to begin a program when they choose, rather than via a traditional academic calendar. (Provide multiple, accelerated terms to allow students to begin and finish their online programs in a more timely manner)
8. Explore the utilization of Open SUNY.

Metrics:

- Number of Watson graduate courses available through distance education.
- Number of Watson graduate programs available for completion through distance education only.

Strategy #2: *Market the programs available through distance education.*

Tactics:

1. Foster strategic academic partnerships to expand online learning opportunities to regional, national and global learners.
2. Develop and implement a marketing campaign for each on-line program.
3. Review U.S. News rankings for each program and develop a plan to improve.
4. Leverage Open SUNY.
5. Work with employers to identify unmet continuing education needs that could be addressed through online opportunities and develop those opportunities in an efficient and effective manner.
6. Create a market analysis role to identify local, domestic and global market for programs.
7. Target prospective students with non-engineering/computer science undergraduate degrees who may be interested in careers in engineering.
8. Develop department specific bridge programs for students with non-engineering/computer science backgrounds, removing the barrier for many students to enter a graduate program in the Watson School.

Metrics:

- Number of applications for on-line programs.
- Number of students enrolled in on-line courses and programs.
- Improvement in U.S. News Ranking for on-line programs.

Strategy #3: *Ensure the quality of on-line courses.*

Tactics:

1. Create opportunities for faculty to continually learn about innovations in online teaching and learning.
2. Create an assessment tool to determine if learning is optimal for on-line learner.

3. Appoint or hire a department specific professor of practice or senior faculty member to assist faculty with assessing and improving their pedagogical approach to teaching on-line.
4. Establish a proctoring protocol to ensure academic integrity of our online programs

Metrics

- Number of students enrolled in on-line courses.
- Retention of on-line students.

Strategy #4: *Ensure support services that promote student success are available for online students.*

Tactics:

1. Use a process to confirm that on-line learners have access to services equivalent to those used by campus-based students.
2. Create a community for on-line learners. (e.g. Student Chapter for Online Learners)

Metrics

- Number of students enrolled in on-line courses.
- Retention of on-line students.

Summary

The rise of on-line learners is evidence that students are moving more and more to distance education as some part of their academic career. As we examine our pedagogy and explore innovations in teaching to respond to the changing student, we also need to think about how this student wants to access his or her education. This segment of students who are choosing distance education is a market we cannot ignore.

With a goal of growing the enrollments in our graduate programs through distance education, it is important to address the threats to this goal – mainly competing with MOOCS and other non-profit and for-profit on-line education providers. A thorough market analysis for each program we would like to grow on-line would be important to determine how we can differentiate our programs from competitors and what we need to offer to be competitive (e.g. courses offered on demand, student support services, etc.). A quick review of Stony Brook University's and University at Buffalo's online offerings in engineering and computer science shows little overlap in the programs we would be growing online. Both university centers offer MOOCs through Coursera. This is something to explore. Could we leverage the work already being done for our continuing education courses to reach a bigger audience? Buffalo and Stony Brook provide a badge for an optional fee. Of course, our competition in the for-credit and not-for-credit space goes beyond SUNY and institutions in New York State.

Two other threats that we would need to address is the support desired by a faculty member and the support an on-line student is seeking. In EngiNet, one staff member plays a key role in

supporting both faculty and students, providing technical, administrative and advising support. An additional staff member to assist faculty and students who are outside of EngiNet would be very helpful as we grow these offerings and student enrollments. In addition to staff support, support for faculty to develop on-line courses from a professor of practice or a faculty member with experience in the on-line space. The issue of distance proctoring would need to be discussed further with faculty to determine an acceptable solution.

The growth of on-line for-credit and not-for-credit offerings can help with both undergraduate and graduate recruitment. From providing bridge courses to entering 1st year undergraduates and 1st year graduate students to allowing students to begin their studies before even coming to campus (e.g. international students), there are many new entry points for prospective students with the growth of on-line courses. On-line courses will also enhance the school's ability to add additional markets for graduate recruitment, which will allow us to become more selective. To grow our continuing education/professional education offerings, we are working closely with our industrial advisory board to ensure the competency areas we are focused on growing is a fit with their needs now and into the future. If we can become a key partner in closing any skill gaps their employees may have, that will be critical to the growth of offerings and, thereby, revenue. The adoption of microcredentials is an opportunity to provide value for a not-for-credit course, provide a bridge to for-credit courses and perhaps a degree.

Submitted by Elizabeth Kradjian, Assistant Dean for Strategy and External Affairs, in collaboration with Michael Testani, Director for the Office of Industrial Outreach, and the Watson School's On-line Education Committee, chaired by Professor Sangwon Yoon of the Systems Science and Industrial Engineering Department.

Appendix A

Table 3. Number and percentage distribution of students enrolled at Title IV institutions, by control of institution, student level, level of institution, distance education status of student, and distance education status of institution: United States, fall 2017

Student level, level of institution, distance education status of student, and distance education status of institution	Total		Public		Private			
					Nonprofit		For-profit	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total students	**20,138,477**	**100.0**	**14,669,554**	**100.0**	**4,123,290**	**100.0**	**1,345,633**	**100.0**
Enrolled exclusively in distance education courses	3,104,913	15.4	1,657,959	11.3	788,439	19.1	658,515	48.9
Exclusively distance education institutions	401,384	2.0	31,607	0.2	142,543	3.5	227,234	16.9
Not exclusively distance education institutions	2,703,529	13.4	1,626,352	11.1	645,896	15.7	431,281	32.1
Enrolled in some, but not all, distance education courses	3,552,651	17.6	3,034,261	20.7	392,865	9.5	125,525	9.3
Not enrolled in any distance education courses	13,480,913	66.9	9,977,334	68.0	2,941,986	71.4	561,593	41.7
Undergraduate	**17,133,000**	**85.1**	**13,210,352**	**90.1**	**2,833,620**	**68.7**	**1,089,028**	**80.9**
4-year	10,818,442	53.7	7,394,280	50.4	2,768,691	67.1	655,471	48.7
Enrolled exclusively in distance education courses	1,461,660	7.3	590,022	4.0	439,955	10.7	431,683	32.1
Exclusively distance education institutions	245,265	1.2	21,759	0.1	108,884	2.6	114,622	8.5
Not exclusively distance education institutions	1,216,395	6.0	568,263	3.9	331,071	8.0	317,061	23.6
Enrolled in some, but not all, distance education courses	2,114,610	10.5	1,755,501	12.0	270,891	6.6	88,218	6.6
Not enrolled in any distance education courses	7,242,172	36.0	5,048,757	34.4	2,057,845	49.9	135,570	10.1
2-year	6,057,268	30.1	5,766,807	39.3	54,086	1.3	236,375	17.6
Enrolled exclusively in distance education courses	773,772	3.8	743,835	5.1	19,723	0.5	10,214	0.8
Exclusively distance education institutions	3,501	#	54	#	0	0.0	3,447	0.3
Not exclusively distance education institutions	770,271	3.8	743,781	5.1	19,723	0.5	6,767	0.5
Enrolled in some, but not all, distance education courses	1,161,388	5.8	1,133,894	7.7	4,313	0.1	23,181	1.7
Not enrolled in any distance education courses	4,122,108	20.5	3,889,078	26.5	30,050	0.7	202,980	15.1
Less-than-2-year	257,290	1.3	49,265	0.3	10,843	0.3	197,182	14.7
Enrolled exclusively in distance education courses	773	#	193	#	30	#	550	#
Exclusively distance education institutions	34	#	0	0.0	0	0.0	34	#
Not exclusively distance education institutions	739	#	193	#	30	#	516	#
Enrolled in some, but not all, distance education courses	2,442	#	240	#	506	#	1,696	0.1
Not enrolled in any distance education courses	254,075	1.3	48,832	0.3	10,307	0.2	194,936	14.5

See notes at end of table.

Table 3. Number and percentage distribution of students enrolled at Title IV institutions, by control of institution, student level, level of institution, distance education status of student, and distance education status of institution: United States, fall 2017—Continued

Student level, level of institution, distance education status of student, and distance education status of institution	Total		Public		Private			
					Nonprofit		For-profit	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Graduate	**3,005,477**	**14.9**	**1,459,202**	**9.9**	**1,289,670**	**31.3**	**256,605**	**19.1**
Enrolled exclusively in distance education courses	868,708	4.3	323,909	2.2	328,731	8.0	216,068	16.1
Exclusively distance education institutions	152,584	0.8	9,794	0.1	33,659	0.8	109,131	8.1
Not exclusively distance education institutions	716,124	3.6	314,115	2.1	295,072	7.2	106,937	7.9
Enrolled in some, but not all, distance education courses	274,211	1.4	144,626	1.0	117,155	2.8	12,430	0.9
Not enrolled in any distance education courses	1,862,558	9.2	990,667	6.8	843,784	20.5	28,107	2.1

Rounds to zero.

NOTE: Title IV institutions are those with a written agreement with the U.S. Department of Education that allows the institution to participate in any of the Title IV federal student financial assistance programs. The four U.S. service academies that are not Title IV eligible are included in the Integrated Postsecondary Education Data System (IPEDS) universe because they are federally funded and open to the public. Students who self-identify with more than one race are included in the Two or more races category. Individuals who are in the United States on a visa or temporary basis, and who are not authorized to remain indefinitely, are included in the Nonresident alien category regardless of race or ethnicity. Students of Hispanic or Latino ethnicity are included in the Hispanic or Latino category regardless of race. Percentages in the columns of this table use the corresponding count in the "Total students" row as the denominator. Detail may not sum to totals because of rounding. Definitions for terms used in this table may be found in the IPEDS online glossary located at https://surveys.nces.ed.gov/ipeds/VisGlossaryAll.aspx.

SOURCE: U.S. Department of Education, National Center for Education Statistics, IPEDS, Spring 2018, Fall Enrollment component (provisional data).

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A Strategic Plan for Diversity, Equity, and Inclusion
Thomas J. Watson School of Engineering and Applied Science

Residing within a public research institution, the Thomas J. Watson School of Engineering and Applied Science (Watson) seeks to educate and prepare the next generation of scientists, researchers, and innovators. As of 2018, Watson enrolled 3,207 students across six departments and awarded 491 undergraduate and graduate degrees. Attentive to the trends and national initiatives surrounding STEM education, the Watson School has made it a priority to support diverse populations within STEM, with a specific focus on historically underrepresented minorities (URM) and women in STEM. This plan will outline the strategies, and tactics needed to address Watson's diversity goals. These goals are informed by national trends, Watson's current successes and initiatives, and peer institutions.

Landscape:

Nationally there is a focus on diversifying science, technology, engineering, and math (STEM). The National Science Foundation (NSF) releases a bi-annual report regarding the enrollment, fields of degree, employment, and occupation of women, persons with disabilities, and URM groups (blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives) within science and engineering (S&E). As of the most recent report, URM groups are more likely to pursue their undergraduate degree at a public institution than their White-counterparts and conversely, URM women enroll in graduate school more frequently than their male-counterparts (NSF, 2019). This presents Watson with a unique opportunity to address the gender and racial disparities within S&E with purposeful and deliberate actions.

As an institution of higher education, it is also critical to represent the diversity of our students through the faculty and staff. Best-practices indicated that the professoriate and staff, especially leadership, should also be diverse. Nationally, women comprise 17.4 % of Tenure-track/Tenured Faculty positions and URM groups comprise approximately 6.2% (ASEE, 2018). These figures do not reflect the desired or current diversity of the undergraduate class of S&E students. Furthering the call for direct and deliberate actions to diversify S&E.

As of 2018, Watson enrollment was composed of over 23% women and 12% URM students. Of the degrees awarded 207-18, approximately 23% were awarded to women and 15% to URM students. There has been a small upward trend in the enrollment of these groups, however, we will strive to make strides to align with and exceed national averages and peer institutions (see appendices).

Watson's faculty is comprised of 20% women and 1.8% URM. Within Biomedical Engineering and Engineering Design are the highest percentage of women faculty. All URM faculty are housed in the System Science/Industrial Engineering department. Efforts are being made to increase the diversity of the faculty with SUNY's PRODiG initiative. In addition to the representation of women and URM faculty, we have found that the level of the faculty is also a key indicator of diversity and inclusivity. Of our women faculty, the majority of women are junior faculty – 17% Professor, 13% Associate Professor, and 35% Assistant Professor.

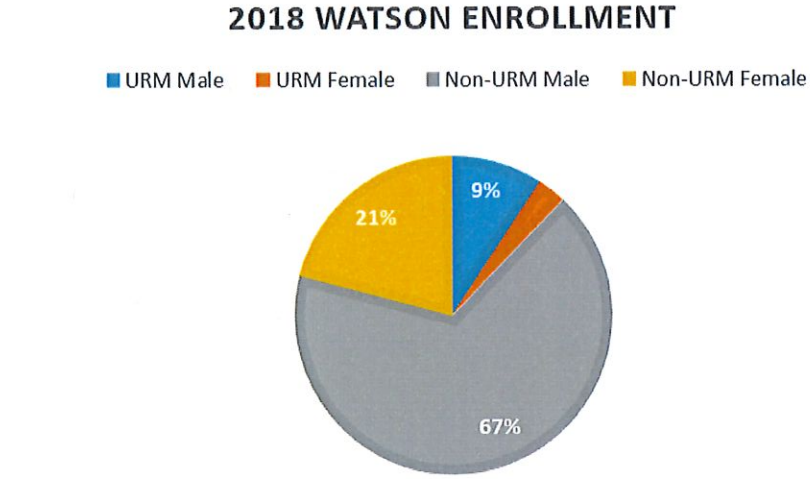
Watson's 55 staff persons support the faculty and students in pursuing academic excellence. The staff distribution is skewed, 69% women. Conversely, 9% identify as URM. Of the women staff persons, the majority serve as support staff-Secretary 1 (11) and Senior Staff Associate (8). There are currently no

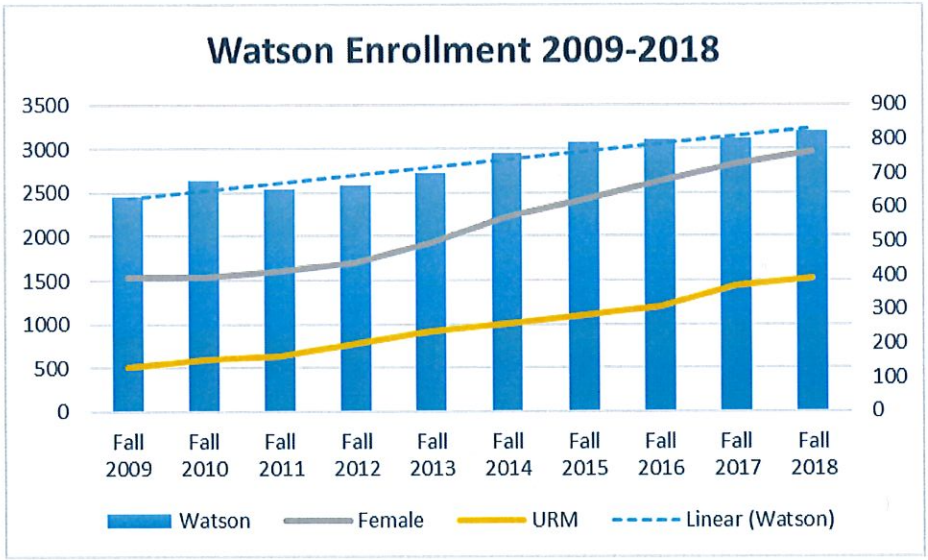
URM staff who serve as an Assistant or Associate Dean. URM and women hold SL5 as the highest salary designation.

Considering the aforementioned, this plan will serve as a means to increase diverse representation by informing future practices, activities, and programs.

Watson Today-Current Projects, Programs, and Initiatives:

As of October 2019, Watson was recognized by Woman Engineer Magazine as one of the Top 20 Universities Fostering Diversity and Inclusion. This ranking also lists Carnegie Mellon University, Columbia University, Cornell University, Georgia Institute of Technology, Massachusetts Institute of Technology, and Texas A&M. This recognition highlights our annual increases in women enrollment, degree attainment, and the diversity of Watson faculty.





Review of Watson's priority and efforts to support URM and Women in STEM called forth the development of a diversity officer position –Director of Diversity Programs and initiatives. This role has allowed for the maintenance and expansion of diversity-focused efforts. Under this role's purview is the oversight of pipeline programs and outreach programs, procurement of funding for diversity efforts, analysis of current faculty and staff initiatives, and maintenance of relationships with external stakeholders interested in supporting STEM diversity. The current and pending programs, projects, and initiatives are listed below:

College-Student Focused

- Louis Stokes Alliance for Minority Participation (LS-AMP)
- LSAMP Bridge to the Doctorate
- U-RISE-NIH (Pending)
- National GEM Consortium
- Articulation Agreements and Partnerships
    - Xavier University of Louisiana
    - University of Maryland Eastern Shore
    - Borough of Manhattan Community College
- Transfer Student Programming and Networking
- D-Coding Project (pending)

Faculty and Staff Focused

- PRODiG
- Committee on Diversity and Inclusive Excellence
- ADVANCE- NSF (Pending)

Externally-focused

- Diversity Visitation Experience (DIVE)
- Summer Training Experience in Engineering Research (STEER)

Outreach-focused

- Science Technology Entry Program (STEP)
- Upward Bound Math-Science (UBMS)

Where we are going:

Watson's 2025 Vision: In the pursuit of academic diversity and inclusive excellence, Watson seeks to establish an equity-minded STEM community that challenges and eliminates exclusionary systems and practices and promotes innovation and academic success for all students, faculty, and staff.

The Watson's 2020 Diversity Plan sought three goals to support the increase of diversity and inclusion efforts; these will remain Watson's goals.

1. To become a leader in diversity and inclusion in engineering & computer science;
2. To increase the number of historically underrepresented minorities and women in the Watson School student body, faculty and staff;

3. To foster an environment that supports diversity, inclusion, equity and equity-mindedness.

In order to actualize this vision, Watson's goals, strategies, tactics, and metrics are presented.

Goals, Strategies, and Tactics

Goal: To become a leader in diversity and inclusion in engineering & computer science

Strategy #1: *Build name recognition at high schools, community colleges, and higher education institutions that serve a high number of women and minorities*

Tactics- Advertise in appropriate print and digital media

1. Create and maintain social media presence that highlights faculty, staff, and students from various diverse backgrounds and perspectives
2. Attend and recruit at national and regional diversity-focused conferences and fairs for high school and transfer students.
3. Create and advertise a Center for Academic Diversity and Inclusive Excellence that will house grant programs (e.g. LSAMP, UBMS, STEP) and STEM diversity research initiatives.

Metrics:

- An increase of the total number of unique high schools and community colleges of diverse applicants each year
- Level of social media engagement –followers, clicks, likes, etc.
- Increase in the number of staff hired and/or assigned diversity-focused roles and tasks

Strategy #2: *Create and leverage existing industry partnerships to recruit and support women and URM students.*

Tactics-

1. Develop internship opportunities and/or scholarships to support industry and institutional diversity initiatives
2. Identify alumni donors and advisory board members who have a desire to support diversity-focused initiatives through their companies
3. Create a development campaign to reach out to local, regional, and national organizations who may be interested in creating and/or supporting diversity programs, activities, or scholarships.
4. Create and market a development campaign with organizations that frequently hire Binghamton University and/or Watson graduates.

Metrics:

- Diversity earmarked donations increase to $100,000 with a 20% increase each subsequent year.
- Number of organizations with diversity-focused initiatives that are housed within Watson
- Number of women and URM students in STEM who attend professional conferences or conduct scientific research funded by industry donations/funding.

Strategy #3: *Increase participation in diversity-focused regional, national, and international STEM conferences, forums, and consortia*

Tactics

- Invest in the participation of faculty and staff at these events
- Invest in membership within STEM diversity consortia
- Present at national conferences about best-practices with diversity and faculty research

Metrics:

- # of faculty members who attend and present at diversity-focused conferences (e.g. ABRCMS, NSBE, ERN)
- # of diverse prospects received from consortia memberships such as GEM or the National Name Buy

Goal: To increase the number of historically underrepresented minorities and women in the Watson School student body, faculty and staff

Strategy #1: Provide K-12 STEM education and created a pipeline for future STEM students

Tactics-

- Improve awareness of K-12 STEM programs to faculty, especially those writing Early Career Awards and other grants
- Expand current grants and collaborations between Binghamton University and local and state K-12 institutions
- Develop a focused recruitment plan to conduct outreach with STEM-focused non-profit organizations and non-governmental organizations

Metrics:

- Total number of high schools and high school initiatives Watson faculty and student groups (e.g. SHPE and NSBE) interact with annually
- Total number of prospective students from collaborators
- Total number of grant submissions that include K-12 initiatives within the Broader Impacts statement

Strategy #2: Create feeder relationships with high schools, high school programs, and community colleges to increase the quantity of women and minority undergraduate applicants, admitted and enrolled students.

Tactics-

- Work with the Office of Undergraduate Admissions and Watson Advising to identify potential feeder schools.
- Explore more holistic application tactics
- Develop a bridge program for transfer students to ease the transition and integrate students into the Watson academic community.

Metrics:

- Increase New Freshman Female Enrollment to 30% by 2025
- Increase New Freshman URM Enrollment to 25% by 2025
- Increase New Transfer Female Enrollment to 30% by 2025
- Increase New Transfer URM Enrollment to 25% by 2025

Strategy #3: Create feeder relationships to increase the quantity of women and minority graduate students:

Tactics-

- Establish and execute articulation agreements with CUNY institutions, HBCUs, HSIs, Tribal-Colleges, and MSIs.
- Develop funding streams to support URM and WSTEM graduate students from feeder institutions.
- Invite and encourage current URM and WSTEM graduate students to attend professional development conferences and assist in recruiting.
- Diversity Visitation Experience expansion to encourage additional students to apply and attend.
- Develop a teaching partnership with community and comprehensive colleges -- Graduate Academic Teaching Excellence (GATE Program) development and implementation
- Create and execute a diversity development campaign to procure funds to support diverse students' scholarship, research, and professional development.
- Invest and participate in "name buys," such as GEM

Metrics:

- Increase New Graduate Female Enrollment to 30% by 2025
- Increase New Graduate URM Enrollment to 15% by 2025

Strategy #4: Develop plans to support the hiring and promotion of diverse faculty

Tactics-

- Investigate and examine best-practices to diversify faculty
- Identify and commit to attend conferences focused on the recruitment of diverse faculty (e.g. Compact for Diverse Faculty, Academic Network, GEM, etc.)
- Partner with other Research Centers to identify diverse graduate students to recruit.
- Create a Visiting Professor position to recruit diverse faculty.
- Mandated diversity training for Search Committee members
- Leverage the financial support of PRODiG eligible hires

Metrics:

- Increase in the number of women candidates in faculty searches
- Increase in the number of URM candidates in faculty searches
- Increase female T/TT Faculty to 30% by 2025
- Increase URM T/TT Faculty to 10% by 2025
- Increase the number of female Associate and Full Professors to 25% by 2025

Strategy #5: Develop plans to support the hiring and promotion of diverse staff members

Tactics-

- Investigate and examine best-practices to diversify staff
- Facilitate and invest in the professional development of current staff
- Advertise staff positions on diversity-focused and inclusive job boards

- Diversify the search committees for staff positions

Metrics:

- Increase in the number of URM applicants for staff positions
- Increase in the number of female and URM applicants for leadership positions
- Increase in the number of URM staff in leadership positions
- Increase URM staff members to comprise 20% of the staff

Goal: To foster an environment that supports diversity, inclusion, equity and equity-mindedness.

Strategy #1: Increase opportunities for diverse students

Tactics-

- Offer educational and celebratory events and promote collaborative programming for students, faculty, staff, and the community to recognize success and to honor and promote inclusion within STEM.
- Encourage and support NSF supplemental and REU grant applications from Watson faculty
- Create and support the Center for Academic Diversity and Inclusive Excellence

Metrics:

- Increase in the number of NSF supplemental and REU grant applications from Watson faculty
- Increase in the number of research grant applications from the Director of Diversity Programs and Initiatives or other related personnel

Strategy #2: Support and implement inclusive classroom and pedagogical practices

Tactics-

- Encourage the infusion of different cultural perspectives into classroom discussions by offering faculty and staff seminars on ways to interact, mentor, and support diverse students.
- Identify applied learning opportunities (e.g. service learning, etc.) which develop and apply students' diversity and inclusion competencies.
- The development of unique diversity statements for new and revamped courses

Metrics:

- Positive changes in the Watson climate survey results for each population –faculty, staff, and students
- Increase in the number of courses with a Service-Learning or Community Engagement designation

Strategy #3: Require leaders, managers, and faculty to demonstrate, in tangible ways, management competencies that support diversity and inclusion.

Tactics-

- Solicit student, faculty, and staff feedback on Watson's climate via focus groups and a climate survey, bi-annually.
- Include diverse, specifically URM and female, students on search committees as appropriate

- Invite a diverse undergraduate and graduate student to join the Committee for Diversity and Inclusive Excellence.
- Cultural Competency trainings for students, faculty, and staff

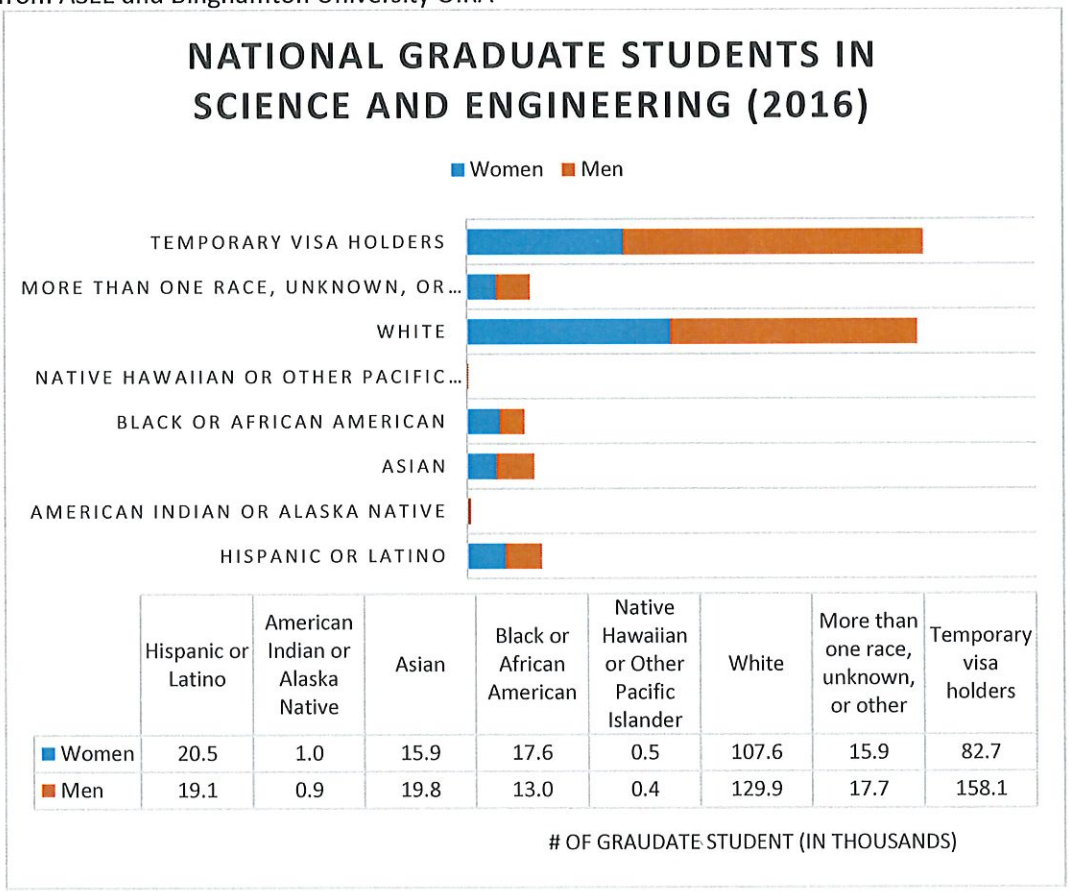
Metrics:

- Positive changes in the Watson climate survey results for each population –faculty, staff, and students
- Increase in diversity of leadership across Watson

Student Data

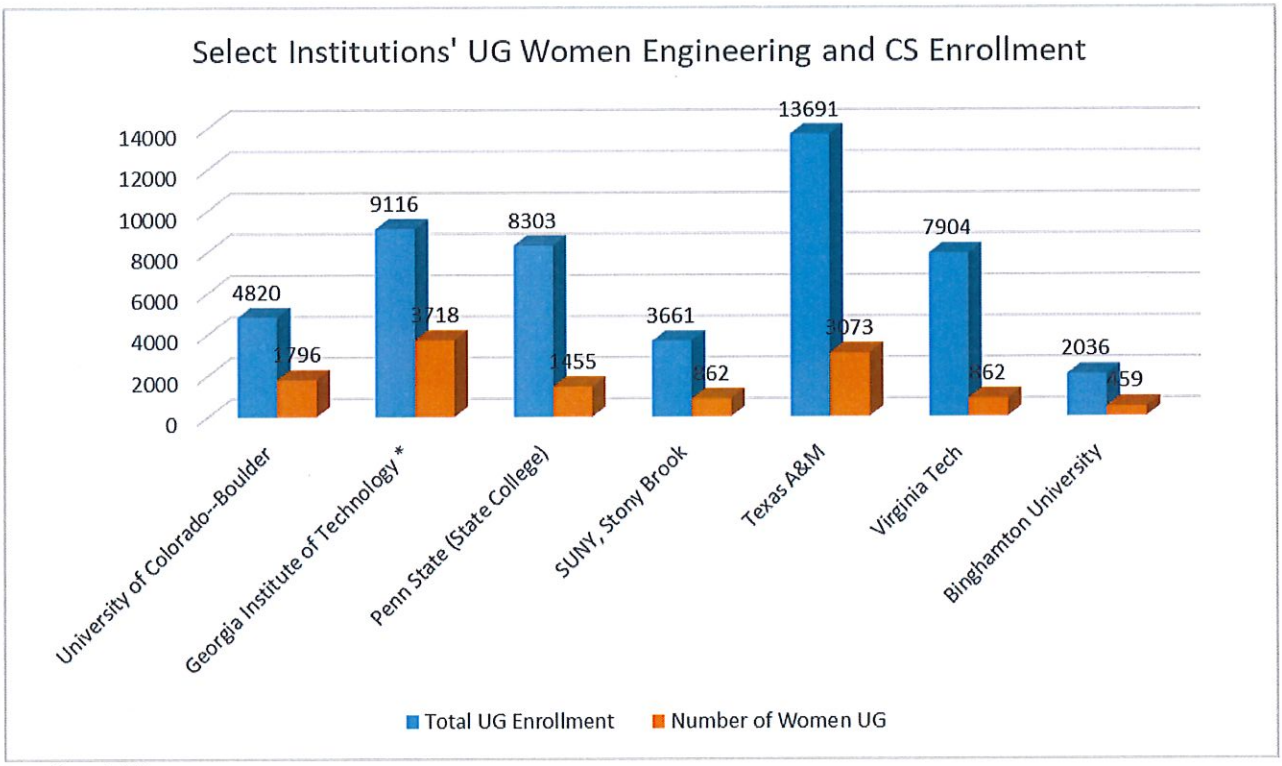
National Engineering and CS Enrollment	Women	URM	Total	Watson Enrollment	Women	URM	Total
Bachelor	26%	13%	622502	Undergraduate	23%	16%	2035
Master	28%	15%	93559	Master	22%	6%	782
Doctoral	26%	13%	78715	Doctoral	27%	7%	376
National Engineering and CS Degree Attainment	**Women**	**URM**	**Total**	**Watson Degree Attainment**	**Women**	**URM**	**Total**
Bachelor	22%	16%	136233	Bachelor	22%	12%	370
Master	26%	14%	66340	Master	25%	25%	110
Doctoral	24%	10%	12156	Doctoral	36%	9%	11

Data from ASEE and Binghamton University OIRA



	Hispanic or Latino	American Indian or Alaska Native	Asian	Black or African American	Native Hawaiian or Other Pacific Islander	White	More than one race, unknown, or other	Temporary visa holders
Women	20.5	1.0	15.9	17.6	0.5	107.6	15.9	82.7
Men	19.1	0.9	19.8	13.0	0.4	129.9	17.7	158.1

Data from NSF Report



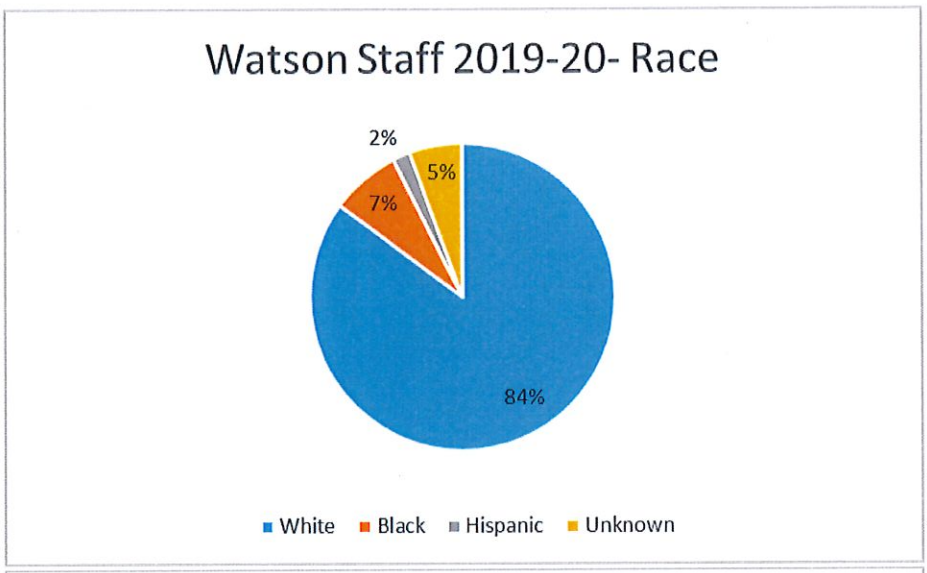
Data from ASEE

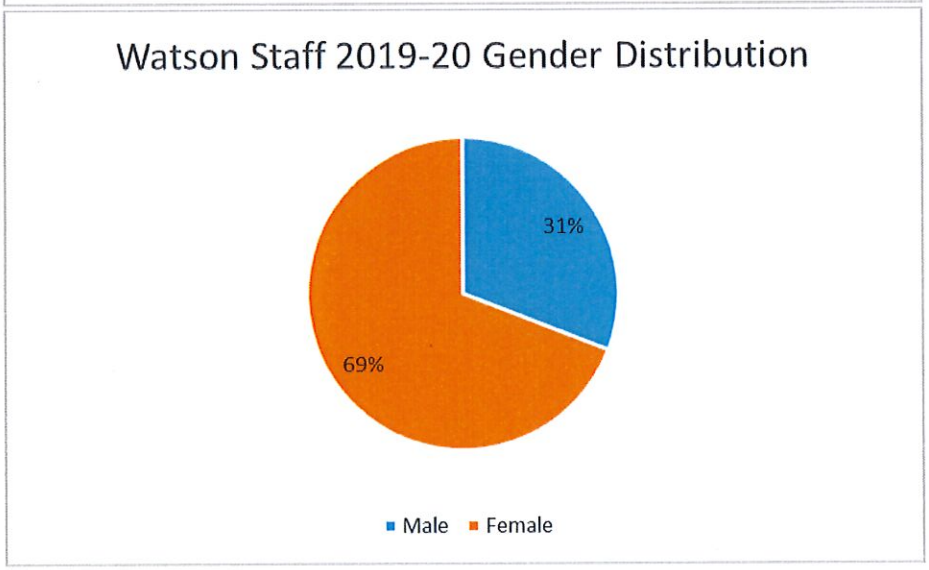
Faculty Data

Engineering and CS TT/T Faculty	Women	URM	Total
National	17.4%	6.2%	27412
Watson	20.2%	1.8%	114

	FT-Fac.	Prof	Assoc Prof	Asst Prof	Lecturer	Other	White	Native American	Black	Asian	Hispanic
Watson Total	**114**	**35**	**22**	**41**	**18**	**15**	**49**	**0**	**1**	**62**	**1**
Female	23	4	3	8	4	7	11	0	0	11	0
Male	91	31	19	33	14	8	38	0	1	51	1
Biomedical Engineering	**11**	**2**	**2**	**5**	**2**	**0**	**7**	**0**	**0**	**4**	**0**
Female	5	0	2	2	0	0	3	0	0	2	0
Male	6	2	0	3	2	0	4	0	0	2	0
Computer Science	**33**	**8**	**7**	**12**	**7**	**4**	**8**	**0**	**0**	**25**	**0**
Female	5	0	0	2	2	1	1	0	0	4	0
Male	28	8	7	10	5	3	7	0	0	21	0
Elec Comp Eng	**19**	**6**	**7**	**7**	**3**	**0**	**9**	**0**	**0**	**10**	**0**
Female	1	2	0	0	1	0	1	0	0	0	0
Male	18	4	7	7	2	0	8	0	0	10	0
Engineering Design	**6**	**0**	**0**	**0**	**3**	**4**	**6**	**0**	**0**	**0**	**0**
Female	4	0	0	0	1	4	4	0	0	0	0
Male	2	0	0	0	2	0	2	0	0	0	0
Mechanical Eng	**22**	**9**	**4**	**7**	**2**	**4**	**13**	**0**	**0**	**9**	**0**
Female	4	0	1	3	0	2	2	0	0	2	0
Male	18	9	3	4	2	2	11	0	0	7	0
Sys Sci/Ind Eng	**23**	**10**	**2**	**10**	**1**	**3**	**6**	**0**	**1**	**14**	**1**
Female	4	2	0	1	0	0	0	0	0	3	0
Male	19	8	2	9	1	3	6	0	1	11	1

Staff Data


Watson Staff 2019-20- Race
2%
5%
7%
84%
White
Black
Hispanic
Unknown


Watson Staff 2019-20 Gender Distribution
31%
69%
Male
Female

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BINGHAMTON UNIVERSITY
STATE UNIVERSITY OF NEW YORK

Thomas J. Watson School of Engineering and Applied Science

Research Strategic Plan 2020 – 2024

"Increased research activity leads to increased revenue, higher rankings, and more student applications and increased tuition [Litwin, 2009]."

Growth in faculty research productivity is central to the Watson School's long-term strategic plan. As noted in the quote above, increased research supports growth in graduate enrollment, which supports higher ranking and ultimately, the flow of more resources to the Watson School. For the first time in its history, Binghamton University (BU) has been ranked in the highest category of the Carnegie Classification of Higher Education Institutions: R1. BU is now among the highest-ranked doctoral universities in the U.S. in the 'very high research activity' category as measured by having at least 20 research/scholarship doctoral degrees and at least $5 million in total research expenditures. The Watson School's role in the university ranking has been, and will continue to be, a significant contributor.

The following charts show the history, current state, and planned growth over the next five years in research, new faculty hires, and graduate enrollment and the specific strategies that detail the path for achieving this growth.

Chart 1 shows Watson research expenditures for the period 2010 - 2019 (actual) to 2020 - 2024 (projected growth) as a percentage of campus research expenditures. The contribution of the Watson School to the total campus research dollars has grown over the years and expectations are strong that Watson will be the lead contributor among the other campus units. This growth is the result of an increase in graduate school enrollment (Chart 2), which has resulted in resources provided by campus leadership for new faculty hires. In 2013, Watson had 70 tenure track positions. By 2019-20 this number increased by 36% to 95 positions (Chart 3).

Chart 4 shows Watson research activity (proposals, committed funds, new awards, expenditures, and research project assistants) for the period 2016 to 2019 (actual) to 2020 – 2024 (projected growth). The Watson School's goals for the next 5 years are ambitious: total research expenditures of $40 million; 135 total tenure track/tenured faculty; per capita expenditures of approximately $300 thousand; per capita research project assistants of three; and per capita PhD students of four.

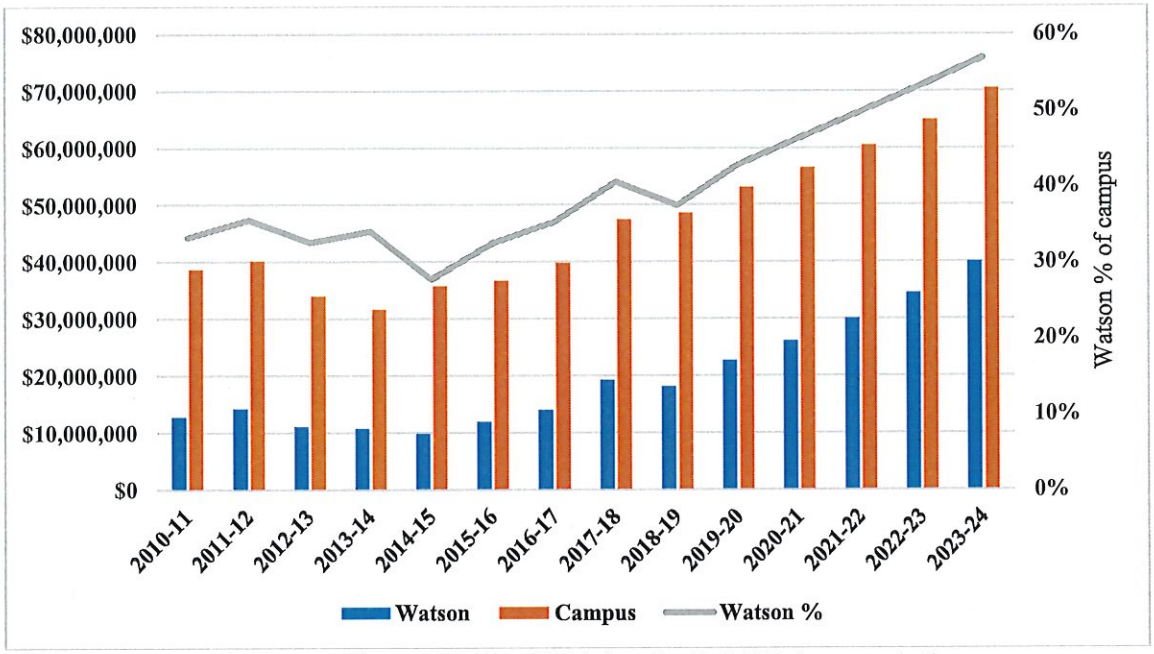

Chart 1: Research Expenditures 2010 – 2024 (projected) Watson and Campus

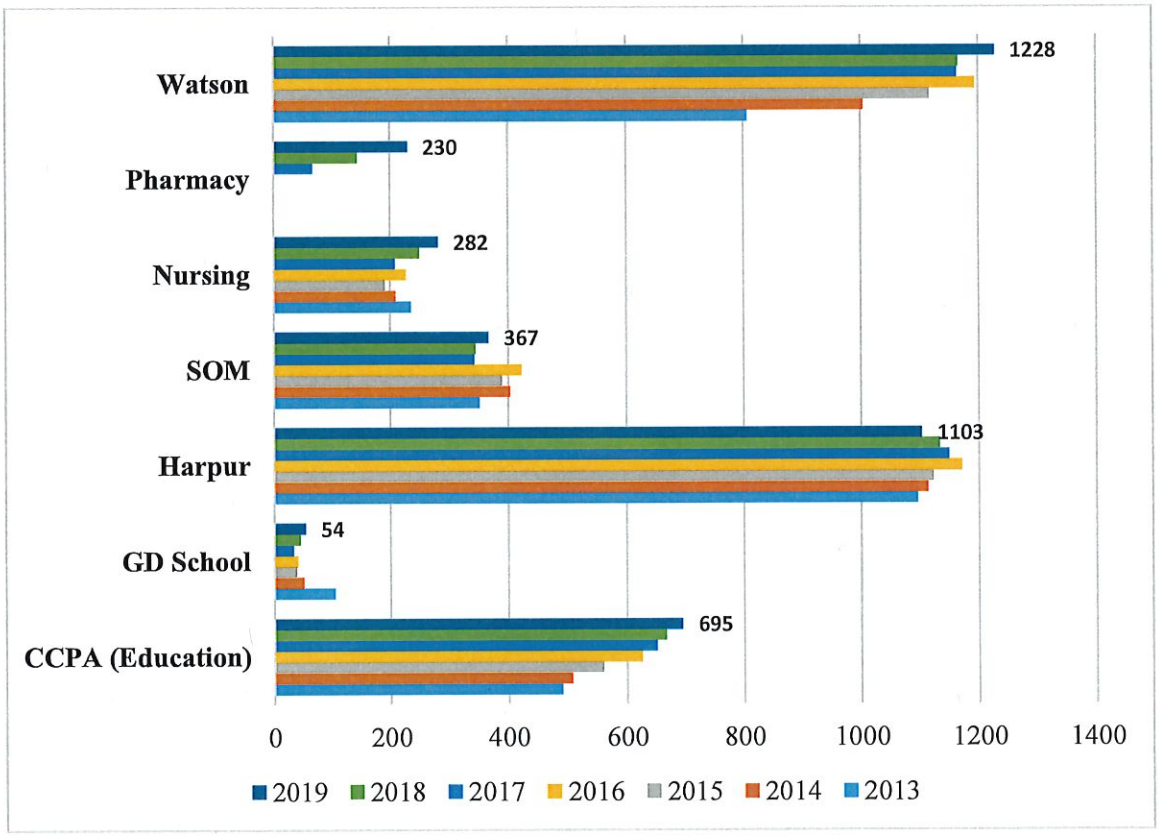

Chart 2. Binghamton University Graduate Enrollment by College 2013 - 2019

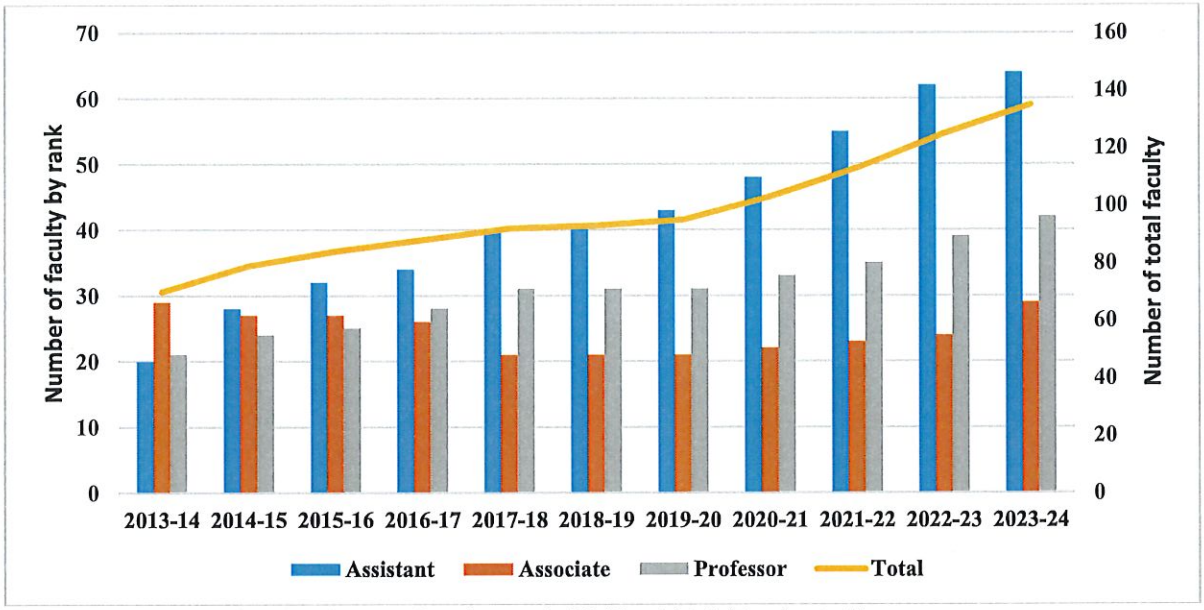

Chart 3. Watson faculty by academic rank 2013 - 2024 (Projected)

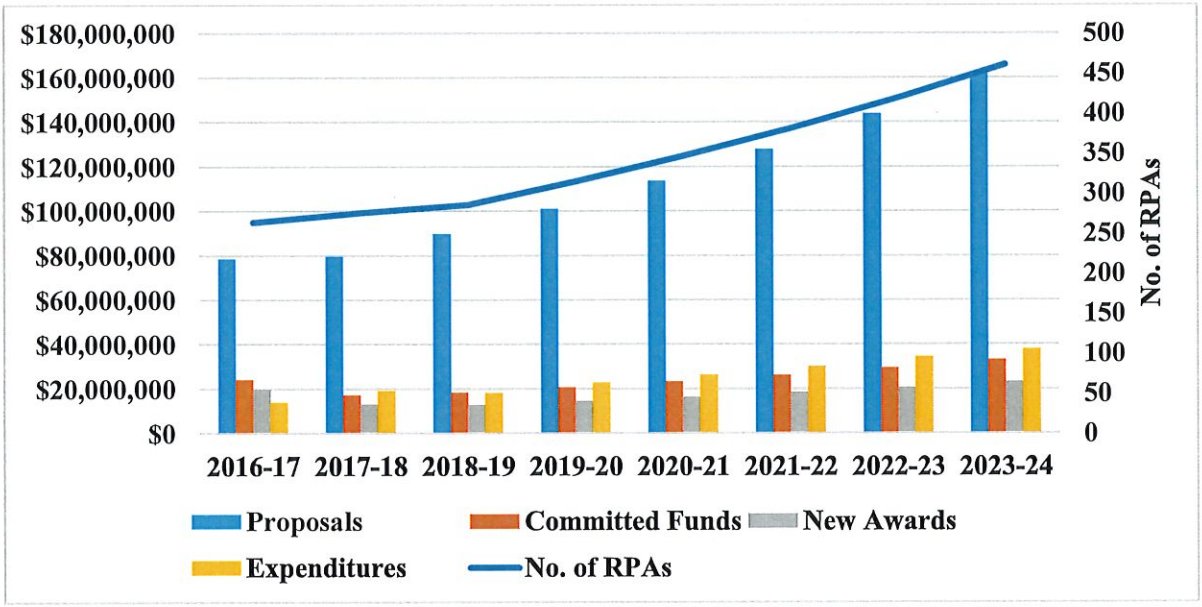

Chart 4. Watson research activity 2016 – 2024 (Projected)

Research growth

Strategies to increase research activity for the Watson School are initiatives aimed at (i) maximizing existing research strengths, (ii) building competencies and competitiveness to support large, multi PI grants, (iii) recruiting senior and new faculty, (iv) developing reward mechanisms for retention of high performing faculty, (v) hiring support staff for grant writing and marketing will all serve to increase faculty productivity and name recognition (PI and campus).

(i) Maximizing research strengths

A series of workshops around topics that tap existing research strengths and aim to build collaborations and competitive teams were first offered in late 2018-19 and will continue to be offered 2-3 times per academic year. To date, additive manufacturing (AM) and artificial intelligence (AI) workshops were hosted by Dr. Junghyun Cho, Associate Dean for Research and Graduate Studies, with total participation of approximately one-quarter of total Watson faculty. AM and AI are two of the SUNY Chancellor's eight research priorities (see Attachment 1), of which Watson faculty currently have expertise in seven of the eight. There will be SUNY-wide funding opportunities working with IBM AI program (up to $55M) and Applied Materials (up to $50M) planned to start in spring 2020 over the next seven years.

(ii) Large, multi-PI grants

Federal funding opportunities in AM, AI, Healthcare, Cyberinfrastructure, major equipment (NSF MRI), mid-scale infrastructure (NSF R1-1 and R1-2), and center grant proposals (NSF STC and ERC) are opportunities for leveraging faculty expertise and collaboration. Partnering with local industry/organizations and the campus to offer seed grants (i.e., Lockheed Martin, Collins Aerospace, BAE, Raymond, and UHS) are additional pathways for developing clusters of research concentrations for funding.

(iii) Faculty

Recruiting senior faculty in aforementioned research priorities is an essential element of developing competitive teams for large grants. Current faculty searches for 2020-21 include one senior hire supported by the SUNY Empire Innovation Program (EIP), headed by Dr. Cho, which will provide two additional senior hires in AI/healthcare cluster over the next two years (3 senior hires total from EIP). Additional junior faculty hires are anticipated.

As noted in Chart 3 above, since 2013, the Watson School tenure-track faculty have grown by one-third, mainly in the rank of assistant professor. Associate professors (twenty-nine in 2013 to twenty-one in 2019) have been promoted into professor titles which in turn has grown that population by nearly 48%.

The large number of assistant professors is both an opportunity and a threat. These faculty are the future leaders of the school and efforts to increase retention are critical to maintaining a talent pool for years to come. Efforts include early involvement in onboarding sessions (twice a semester in the fall), proposal writing workshops (NSF CAREER bootcamp series, working with Division of Research), RF research mixers, seed / internal funding opportunities (i.e., UHS), support in NSF REU supplement and site proposal writing, free proofreading services for manuscripts and proposals, travel grants to funding agencies and conferences to encourage presentations to increase name recognition and support scholarship, departmental mentoring, and participation in SUNY DoD Day.

(iv) Incentives/rewards

Engaging and providing opportunities for faculty to be successful and continue their careers at BU will require rewards, such as a reduced teaching load for research active faculty (i.e., $500K+ annual research expenditures).

For late career faculty in a research 'valley', leadership opportunities and supporting master's students (in teaching and advising), and mentoring junior faculty are ways to increase their engagement. Developing an institutional practice of nominating faculty for national awards (i.e., IEEE and ASEE) shows a commitment of the school to the success of faculty and benefits faculty, graduate students, the school, and the institution.

(v) Support staff

Hiring support staff in various capacities will enable Watson faculty to focus on developing their research. Areas where support is most needed include marketing and grant writing. In house expertise in marketing is needed to increase name recognition of PIs and the campus by assisting with open source repository placement, research data plans, promoting research and scholarship activities through websites, print media, and national news exchanges. A professional grant writer will serve to increase faculty productivity by working with individual faculty and faculty teams to ensure proposals are clearly written and meet the sponsor guidelines. This role would also support the faculty nomination process for national awards.

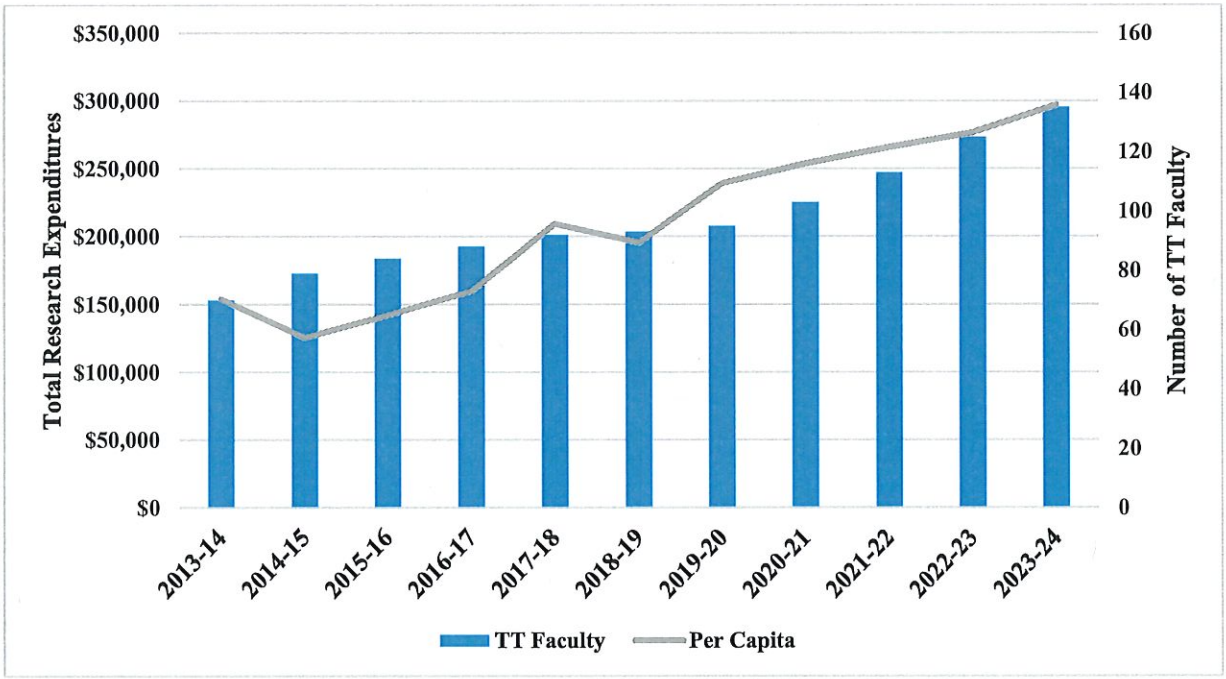

Chart 5. Per Capita Research Expenditures 2013 – 2024 (Projected)

New Academic Programs

New program development is crucial to attracting new faculty talent and graduate students. Currently, a master's degree in data analytics (MS in DA), a multi-disciplinary program between the School of Management, Harpur College (Math Department) and Watson (Computer Science and Systems Science and Industrial Engineering) has been approved and the first cohort will begin in fall 2020. A master's degree in engineering management, housed in Systems Science and Industrial Engineering, is in the process of being reactivated (MEng in Engineering Management). A master's program in information systems (MS in IS) in Computer Science is in process.

In addition, developing a completely new academic department (or program) will be of importance in further growth of the Watson School. Environmental engineering (23.1% projected growth to 2024), construction management, and autonomous systems programs or concentrations are under consideration to expand the Watson programs. These areas are based upon multidisciplinary aspects involving multiple concentrations within the departments (or programs), which are also well aligned with the job growth potential according to the labor statistics.

In summary, the aim of this strategic plan for research in the Watson School is to provide a roadmap of where we want to be in 5 years. The five primary metrics that will provide a measure of our success are:

- Total research expenditures = $40,000,000
- Total tenure track/tenured faculty = 135
- Per capita expenditures of $300,0000
- Per capita research project assistants of 3
- Per capita PhD students of 4

Working together, we aim to meet or exceed these metrics by academic year 2023-24.