FY 2018-2022 FIVE-YEAR CAPITAL OUTLAY PLAN

Recommendation

It is recommended that the Board of Governors approve the attached FY 2018-2022 Five-Year Capital Outlay Plan.

Background and Project Description

Beginning in FY 2001, the University has been required to submit a Five-Year Capital Outlay Plan (the Plan) to the State along with an annual Capital Outlay Project Request. As required, the Plan includes information regarding the University's instructional and research programming, staffing and enrollment, facilities assessment, and construction project priorities.

As was the case during the past three years the University submitted the STEM Innovation Learning Center as its top priority Capital Outlay Project Request for funding consideration in the State's FY2018 budget. During the past six years, Wayne State University has experienced unprecedented growth in students majoring in STEM programs that lead to related bachelor degrees upon graduation. Within the College of Liberal Arts and Sciences, the number of students who have declared a major in a STEM field has risen from 2,639 to 3,884 for an increase of 47 percent. The College of Engineering, which now includes the Department of Computer Science, has seen similar increases, going from 1,022 to 1,981 for an increase of 94 percent over the same period of time. The number of Wayne State students that have been granted STEM degrees has also increased significantly during this time frame. For the College of Liberal Arts and Sciences, undergraduate degrees in these areas have increased from 766 to 940, or 22 percent. The increase in Engineering from Fall 2011 to Fall 2016 has been similar, going from 496 to 657, or 32 percent. Because continued growth in STEM program enrollment is expected, the STEM Innovation Learning Center is a strategically important priority.

When initially planned, the project was envisioned as new construction to provide teaching laboratories and support facilities for various academic programs and course offerings in physics, engineering, computer science, psychology, nutrition and food science, and biological science, for a cost of $20.0 million. When the State Budget Office evaluated the project, it scored well, accumulating 123 points, ranking fifth among twelve University projects submitted during the 2015 fiscal year planning cycle. Two years ago, a new opportunity developed in which the University was able to propose renovating and repurposing an existing structure, the Science and Engineering Library, rather than building a new STEM Innovation Learning Center. When scored, the project accumulated 134 points but still fell short of those projects that did receive State funding support. Last year, the project ranked third, receiving 146 points, and was listed on the State Governor's approved budget recommendations. Despite the Governor's

recommendation, State Representatives selected projects that ranked lower than Wayne State University's to be funded. In this year's submittal, the University improved the data for the project submittal, particularly data regarding facility funding and utilization rates, in hopes to further improve the project's overall score.

The project will provide undergraduate instructional laboratories and support spaces for the 25 foundational STEM courses in biology, chemistry, math, and physics, which will continue to undergo transformation through the efforts of a National Science Foundation grant titled *Student Success Through Evidence-based Pedagogies.* We are confident that this critical initiative will improve STEM student retention, time to degree, and graduation rates. Space will also be provided for courses in engineering, computer science, geology, nutrition and food science, psychology, and anthropology, all of which demand more instructional laboratory capacity due to the unprecedented growth rates in undergraduate student enrollment. The project also features several new program enhancements, outlined below, that will increase student skill set acquisition well beyond foundational course work.

Because the footprint of the first floor is under both the seven-story tower of the building and a section that is comprised of a single-story structure, we intend to develop fume hood intensive instructional laboratories for chemistry and biology in the single-story portion of the first floor to facilitate lab exhaust requirements that avoid running ductwork vertically seven-stories. This provides an organic chemistry lab, two inorganic chemistry labs, and five biology labs to serve this growing population of STEM students. In comparison to previous proposals of the STEM Innovation Learning Center, the first floor program will now also allocate space to a Seminar space, which will provide flexible seating arrangements and high technology.

Each of the upper floors of the project will provide space for four to six instructional laboratories, equipment storage, teaching assistants, and student gathering. In addition to the eight instructional laboratories planned for the first floor, eighteen are planned for the upper floors along with four general purpose classrooms. These new spaces will allow the implementation of evidence-based teaching methods where hands-on experiential, project-based learning are emphasized. Each will be equipped with pods of shared platform technology that will transform traditional fixed seating lecture methods of teaching and learning to those that effectively engage students in collaborative, team-based problem solving and discovery in authentic research experiences. We are currently piloting such approaches through the NIH-funded REBUILD Detroit grant, where we introduced an interdisciplinary research project to explore the impact of pollution on urban gardening. In this project, students collect water, soil, and plant samples and learn how to analyze them and how they are impacted by a variety of pollutants. Adding to the excitement of the STEM Innovation Learning Center will be two maker hacker labs that will give students interdisciplinary exposure to skill set development that are not possible in most instructional settings. For example, mechanical engineering students might work with astronomy students to fabricate a telescope for viewing the evening sky, or mathematics and computer science majors

might work together developing algorithms and code that advance applications that benefit homeland security.

Renovating and repurposing the Science and Engineering Library for STEM instruction is a financially and environmentally responsible solution by comparison to new construction due to the avoidance of constructing the foundation, frame, and building enclosure systems. The building also shares mechanical infrastructure with the adjacent, recently renovated A. Paul Schaap Chemistry Building, eliminating the need to purchase new heating and cooling plants. These cost avoidances enable the University to minimize the project cost per square foot.

The facility will allow integration and reassignment of many existing and transformational redesigned STEM courses that are currently offered in aged and obsolete facilities and teaching labs, some of which were constructed over fifty years ago and have seen limited updates since. Courses from departments that are presently disbursed throughout main campus will be brought together to take advantage of interdisciplinary teaching and learning opportunities and shared resources, thereby reducing some facilities costs. Most importantly, however, is that this project will provide a critical context for best practices in STEM teaching and learning that will translate into more graduates who will be successful in their chosen field.

In summary, by implementing the planned STEM Innovation Learning Center, Wayne State will significantly improve its facilities dedicated to STEM teaching and learning environments. These are resources that are critical in preparing students to excel in an increasingly advanced and interconnected global society. In addition to the significant advantage that the facility will provide to our students, the University and the State will both benefit from increasing the number of STEM graduates who are well prepared to meet a rising need and to contribute to the State's economic progression.

Wayne State is requesting $14.75 million in State Capital Outlay funding (50 percent of the $29.5 million total project cost) to support the STEM Innovation Learning Center project and will use philanthropic gifts or bond proceeds to fund its $14.75 million share of the project.

The instructions from the State indicate that the Plan must be approved annually by the Board. Accordingly, the administration requests your approval.

WAYNE STATE UNIVERSITY

FY2018-2022: 5-Year Capital Outlay Plan

Submitted to the Office of the State Budget

October 31, 2016

By: William Decatur 

Vice President for Finance and Business Operations

Table of Contents

Introduction

Economic Projections for STEM Job Growth

According to the 2012 Report to the President, "Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics," from the President's Council of Advisors on Science and Technology (PCAST), if the nation is to remain competitive in science, technology, engineering, and mathematics (STEM), American universities collectively will need to increase graduates in these areas by one-third annually over current rates; universities will need to produce approximately one million more STEM professionals over the next decade than is predicted under current assumptions in order to retain the United States' historical preeminence in science and technology.

The U.S. Bureau of Labor Statistics forecasts that during the decade between 2012 and 2022 employment in science and engineering occupations is estimated to grow by about 13 percent, compared to 11 percent for all occupations. There is further evaluation, which suggests that of the projected engineering occupation increase, 59 percent will be in computer and mathematical science positions, which also have the largest occupational growth rate at 23 percent. Furthermore, biological, agricultural, and environmental life science job opportunities are expected to increase by about 20 percent, with social science and psychology following behind at a 19 percent expected increase. Supporting the validity of these projections, the U.S. Department of Commerce reported in 2011 that the actual growth rate in STEM jobs was 8 percent for the decade of 2000 through 2010, while non-STEM jobs only grew by about 3 percent nationally. They too project future STEM job growth rates that approximate those of the Bureau of Labor Statistics. Wayne State University students appear to recognize these trends as evidenced by enrollment and corresponding graduation rate increases in STEM fields.

Wayne State University STEM Enrollment Trends and Economic Impacts

During the past six years, Wayne State University has experienced unprecedented growth in students majoring in STEM programs that lead to related bachelor degrees upon graduation. Within the College of Liberal Arts and Sciences, the number of students who have declared a major in a STEM field has risen from 2,639 to 3,884 for an increase of 47 percent (Table 1). The College of Engineering, which now includes the Department of Computer Science, has seen similar increases, going from 1,022 to 1,981 for an increase of 94 percent over the same period of time (Table 2). The number of Wayne State students that have been granted STEM degrees has also increased significantly during this time frame. For the College of Liberal Arts and Sciences, undergraduate degrees in these areas have increased from 766 to 940, or 22 percent. The increase in Engineering from Fall 2011 to Fall 2016 has been similar, going from 496 to 657, or 32 percent!

Table 1: 2011 – 2016 STEM Undergraduate Enrollment Growth by Academic Department for College of Liberal Arts and Sciences (CLAS)

Academic Department	**Fall 2011**	**Fall 2012**	**Fall 2013**	**Fall 2014**	**Fall 2015**	**Fall 2016**	**6 Year % Increase**
Anthropology	86	66	83	110	107	90	4.7%
Biological & Environmental Sciences	782	725	896	1,251	1,436	1,452	85.7%
Chemistry and Biochemistry	291	300	296	353	418	392	34.7%
Geology	41	51	58	51	54	58	41.5%
Mathematics	69	79	85	103	111	113	63.8%
Nutrition & Food Science	331	320	368	444	417	388	17.2%
Physics, Astronomy, & Biomedical Physics	86	96	101	122	133	141	64.0%
Psychology	953	963	1,075	1,223	1,329	1,250	31.2%
Total CLAS	**2,639**	**2,590**	**2,962**	**3,657**	**4,005**	**3,884**	**47.2%**

Source: Office of Budget, Planning and Analysis

Table 2: 2011 – 2016 STEM Undergraduate Enrollment Growth by Academic Department for the College of Engineering

Academic Department	**Fall 2011**	**Fall 2012**	**Fall 2013**	**Fall 2014**	**Fall 2015**	**Fall 2016**	**6 Year % Increase**
Biomedical Engineering	43	76	94	102	116	114	165.1%
Chemical Engineering & Material Science	103	124	134	151	177	187	81.6%
Civil & Environmental Engineering	110	122	131	131	145	155	40.9%
Computer Science	216	286	333	401	474	514	138.0%
Engineering Technology	183	199	195	179	168	205	12.0%
Electrical & Computer Engineering	166	190	183	226	282	324	95.2%
Industrial & Systems Engineering	33	39	50	49	63	63	90.9%
Mechanical Engineering	168	197	227	292	368	419	149.4%
Total Engineering	**1,022**	**1,233**	**1,347**	**1,531**	**1,793**	**1,981**	**93.8%**

Source: Office of Budget, Planning and Analysis

The U.S. Bureau of Labor Statistics also reports that the average annual salary of STEM employees was $76,000 in 2013, which is considerably higher than the average annual salary of $35,080 for

all U.S. employees. STEM jobs are paying nearly 116 percent more than the average U.S. worker earns annually! Because the vast majority of Wayne State STEM graduates remain and accept jobs in the tri-county metropolitan area of Detroit, this statistic is particularly exciting because these graduates offer the opportunity to contribute to the revitalization of Detroit and further strengthen the local economy. These STEM graduates will not only serve as replacements for retiring employees but will also likely secure jobs that do not exist today, jobs arising from the commercialiazation of products, services, and ideas that are developed by STEM entrepreneurs. The *New York Times* article, "Where the Good Jobs Are – and Why," reported that for each STEM-related job produced in a city, five non-STEM jobs are created, further fueling a local economy. Wayne State University STEM graduates are making these impacts possible.

Transforming STEM Education Delivery

Wayne State University recently completed the development of its 2016-2021 strategic plan, titled *Distinctively Wayne State University*. Two of the core focus areas of this plan are student success and teaching excellence. STEM education is a growing priority in the United States, and Wayne State is committed to helping our teachers of today in preparing our future leaders of tomorrow by offering a wide variety of STEM education learning opportunities. Examples of such programs include:

- The National of Institute WIDER (Widening Implementation and Demonstration of Evidence-Based Reforms), was aimed at the evaluation of evidence-based methods in STEM instruction. The program supported a STEM faculty self-assessment of current teaching methods, which included peer-mentor led learning communities and the initiation of departmental conversations on teaching reforms. This pilot grant lead to a set of interventions in foundational STEM courses through the use of workshops and other interactions that supported faculty engagement with the initiative. This became part of the University's strategic plan, which also pinpointed the importance of adopting evidence-based teaching methods to improve student success.

- The National Science Foundation awarded a $3 million grant to Wayne State University in 2015 for an institutional transformation project aimed at reformulating teaching approaches in STEM courses. The grant, Student Success Through Evidence-based Pedagogies (SSTEP), will be divided into competitive awards of up to $100,000 and allocated to STEM departments. Successful departments will work to transform their classes from a lecture-based curriculum to incorporate more evidence-based instructional practices. Through this program, students will experience engaged learning while faculty, postdoctoral fellows and graduate students will be trained in modern, evidence-based teaching methods. The project is led by Andrew Feig, associate dean of the Graduate School and professor of chemistry at Wayne State.

- The National Science Foundation awarded a $1.2 million grant to Wayne State University in 2016 that aims to impact minority students' interest in science, technology,

engineering, and math (STEM) related careers. The project, "Promoting Student Interest in Science and Science Careers through a Scalable Place-based Environmental Educational Program at a Public Aquarium," will train 90 Detroit Public School (DPS) teachers in biological STEM areas related to fisheries, wildlife, conservation and aquatic sciences. More than 2,300 fifth grade students from DPS will benefit over the course of three years by participating in field trips to the Belle Isle Aquarium and follow-up activities. The project is led by Jeffrey Ram, professor of physiology in Wayne State's School of Medicine.

- A consortium of Marygrove College, University of Detroit Mercy, Wayne County Community College District and Wayne State University has been awarded $21.2 million over five years by the National Institutes of Health to implement a program encouraging more undergraduate students from underrepresented and economically disadvantaged backgrounds to pursue careers in biomedical research. The grant was awarded through the NIH's Building Infrastructure Leading to Diversity (BUILD) initiative, created to get more minority and economically disadvantaged students in the STEM pipeline, expose students to research in laboratories and enhance the research-training environment. Studies have shown students from underrepresented backgrounds enter early biomedical research training in numbers that reflect the general population, but they are less likely to persist. The Detroit consortium's project is called REBUILD Detroit - an acronym for Research Enhancement for Building Infrastructure Leading to Diversity. Dr. Ambika Mathur, dean of the Graduate School, is leading Wayne State University's efforts on this program.

- The National Institute of General Medical Sciences of the National Institutes of Health (NIH) awarded a five-year grant of more than $3.6 million that will continue to support the Initiative for Maximizing Student Development (IMSD) program at Wayne State University. The WSU-IMSD program, established in 1978 with NIH support as the Minority Biomedical Research Support (MBRS) program, was developed and has been led by Joseph Dunbar, Ph.D., associate vice president for research at Wayne State, along with Rasheeda Zafar, Ph.D., the program's coordinator. WSU-IMSD's goals are to facilitate the entry, persistence and success of significant numbers of underrepresented minority students into science majors, ultimately guiding them to pursue careers in academics and scientific research.

The increased commitment of Wayne State's faculty and administration to STEM education is helping create the pipeline of future innovators that will move our country forward.

<u>The Wayne State University STEM Innovation Learning Center</u>

As noted, STEM initiatives are a large part of the focus areas of the recently developed *Distinctively Wayne State University, Strategic Plan 2016 - 2021*. A key resource needed to implement these STEM initiatives is the construction of a Laboratory Classroom building that will

foster new methods in educating our STEM undergraduate majors. This directly impacts the State's ecomomy because many studies show that increased focus on STEM fields will be critical in maintaining and advancing Michigan's economy, which is presumably the reason that one of the State's performance funding metric is the number of STEM degrees awarded. Further, the Bureau of Labor Statistics reported earlier this year that of the State's engineers 70 percent of them are employed in the Detroit area. The same report highlights that, on average, Detroit area engineer's annual salaries are 3 percent higher than the State as a whole. Not only will this new facility enable us to develop new science education curricula, it will also be essential in attracting and retaining science and technology majors and increasing the University's capacity to produce more STEM graduates.

When initially planned, the project was envisioned as new construction to provide teaching laboratories and support facilities for various academic programs and course offerings in physics, engineering, computer science, psychology, nutrition and food science, and biological science, for a cost of $20.0 million. When the State Budget Office evaluated the project, it scored well, accumulating 123 points, ranking fifth among twelve University projects submitted during the 2015 fiscal year planning cycle. For the 2016 and 2017 fiscal year planning cycle, to the University proposed renovating and repurposing an existing structure, the Science and Engineering Library, rather than building a new STEM Innovation Learning Center. When scored, the project accumulated 134 points for FY16 and 146 for FY17, placing it in third for FY17 funding.. Desipite placing third among the State's universities, the STEM Innovation Learning Center was not funded. With this 2018 fiscal year Project Request, Wayne State University continues to propose the renovation of the University's Science and Engineering Library and repurposing it as a STEM Innovation Learning Center.

As shown on the floor plans that accompany the Project Request, the project will provide undergraduate instructional laboratories and support spaces for the 25 foundational STEM courses in biology, chemistry, math, and physics, which will continue to undergo transformation through the efforts of the aforementioned NSF grant titled *Student Success Through Evidence-based Pedagogies.* We are confident that this critical initiative will improve STEM student retention, time to degree, and graduation rates. Space will also be provided for courses in engineering, computer science, geology, nutrition and food science, psychology, and anthropology, all of which demand more instructional laboratory capacity due to the unprecedented growth rates in undergraduate student enrollment. The project also features several new program enhancements, outlined below, that will increase student skill set acquisition well beyond foundational course work.

Because the footprint of the first floor is under both the seven-story tower of the building and a section that is comprised of a single-story structure, we intend to develop fume hood intensive instructional laboratories for chemistry and biology in the single-story portion of the first floor to facilitate lab exhaust requirements that avoid running ductwork vertically seven-stories. This provides (1) organic chemistry lab, (2) inorganic chemistry labs, and (5) biology labs to serve this growing population of STEM students. In comparison to previous proposals of the STEM

Innovation Learning Center, the first floor program will now also allocate space to a Seminar space, which will provide flexible seating arrangements and high technology.

Each of the upper floors of the project will provide space for 4 to 6 instructional laboratories, equipment storage, teaching assistants, and student gathering. In addition to the (8) instructional laboratories planned for the first floor, (18) are planned for the upper floors along with (4) general purpose classrooms. These new spaces will allow the implementation of evidence-based teaching methods where hands-on experiential, project-based learning are emphasized. Each will be equipped with pods of shared platform technology that will transform traditional fixed seating lecture methods of teaching and learning to those that effectively engage students in collaborative, team-based problem solving and discovery in authentic research experiences. We are currently piloting such approaches through the NIH-funded REBUILD Detroit grant, where we introduced an interdisciplinary research project to explore the impact of pollution on urban gardening. In this project, students collect water, soil, and plant samples and learn how to analyze them and how they are impacted by a variety of pollutants. Adding to the excitement of the STEM Innovation Learning Center will be (2) maker hacker labs that will give students interdisciplinary exposure to skill set development that are not possible in most instructional settings. For example, mechanical engineering students might work with astronomy students to fabricate a telescope for viewing the evening sky, or mathematics and computer science majors might work together developing algorithms and code that advance applications that benefit homeland security.

Renovating and repurposing the Science and Engineering Library for STEM instruction is a financially and environmentally responsible solution by comparison to new construction due to the avoidance of constructing the foundation, frame, and building enclosure systems. The building also shares mechanical infrastructure with the adjacent, recently renovated A. Paul Schaap Chemistry Building, eliminating the need to purchase new heating and cooling plants. These cost avoidances enable the University to minimize the project cost per square foot.

The facility will allow integration and reassignment of many existing and transformationally redesigned STEM courses that are currently offered in aged and obsolete facilities and teaching labs, some of which were constructed over 50 years ago and have seen limited updates since. Courses from departments that are presently disbursed throughout main campus will be brought together to take advantage of interdisciplinary teaching and learning opportunities and shared resources, thereby reducing some facilities costs. Most importantly, however, is that this project will provide a critical context for best practices in STEM teaching and learning that will translate into more graduates who will be successful in their chosen field.

Plans for the existing obsolete facilities and teaching labs, previously noted, include eventual renovation to provide STEM instruction space in order to support capacity requirements from our growing STEM enrollment rates. Another possibility is to renovate and reassign the space to traditional research programs in biology and geology, whose initiatives are restricted due to space limitations. Projects included in the University's 5-Year Capital Outlay Plan will accomplish

these improvements following the implementation of the STEM Innovation Learning Center project. When these backfill projects are executed there will also be related jobs created for the new STEM faculty needed to educate the growing number of STEM majors.

In summary, by implementing the planned STEM Innovation Learning Center, Wayne State will significantly improve its facilities dedicated to STEM teaching and learning environments. These are resources that are critical in preparing students to excel in an increasingly advanced and interconnected global society. In addition to the significant advantage that the facility will provide to our students, the University and the State will both benefit from increasing the number of STEM graduates who are well prepared to meet a rising need and to contribute to the State's economic progression.

Wayne State is requesting $14.75 million in State Capital Outlay funding (50 percent of the $29.5 million total project cost) to support the STEM Innovation Learning Center project and will use philanthropic gifts or bond proceeds to fund its $14.75 million share of the project.

I. Mission Statement

As stated in the *Distinctively Wayne State University Strategic Plan 2016-2021*, our mission is to create and advance knowledge by preparing a diverse student body to thrive and positively impact local and global communities. To achieve our mission, strategic objectives and tactical action plans have been created and center around seven strategic focus areas: student success, teaching excellence, research, diversity and inclusion, entrepreneurship, financial sustainability and operational excellence, and community engagement.

As Michigan's only urban research university, academic programs and course offerings in science, technology, engineering and mathematics are at the core of our instructional responsibility. STEM programs and course offerings are foundational to every degree that Wayne State University grants, and they are fundamental in preparing our graduates to be effective critical thinkers and major contributors to an increasingly diverse local, state, and global economy. Tactical action plans involving STEM initiatives permeate every focus area of our Strategic Plan. Among these initiatives is the necessity to advance implementation of the STEM Innovation Learning Center, which is Wayne State Univeristy's top Capital Outlay Project Priority Request for the third consecutive year. The STEM Innovation Learning Center, along with the other initiatives which includes the pedagogical developments through recent National Science Foundation grants that are designed to improve STEM program teaching and learning outcomes, will be transformative, resulting in improved student retention rates with those students declaring a STEM major, leading to corresponding increases in STEM graduation. When coupled with the unprecedented increases in STEM program enrollment experienced in recent years, STEM graduation rate performance is expected to surpass all other programs the University offers. Because upwards of 75 percent of Wayne State graduates stay in Michigan for their entire career, these outcomes will serve as major drivers in spurring entrepreneurship and business start-ups, and providing additional fuel to well established industries that particularly benefit job creation in Detroit and southeast Michigan.

II. Instructional Programming

Existing Academic Programs

Wayne State is a comprehensive research University with thirteen schools and colleges administering more than 380 academic programs, including 116 bachelor's, 116 master's, and 67 doctoral degree programs, three professional programs, and 57 certificate and specialist programs, many of which rank in the top tier nationally. The University currently enrolls 27,326 students. Six extension centers in the metropolitan area provide access for residents to a wide selection of off-campus courses. Wayne State is a significant and influential force in metropolitan Detroit's educational and cultural landscape, and TechTown, the 43 acre research and technology park that the University supports, has made it a major player in Michigan's economic turnaround.

Eighty-eight percent of the University's students are from Michigan, with 68 percent from the tri-county metropolitan Detroit area. With 86 percent of Wayne State graduates staying in Michigan after graduation, Wayne State graduates provide the highly educated workforce necessary to transform and power Michigan's economy in the twenty-first century.

Wayne State graduates serve the citizens of Michigan with advanced professional training in business; engineering; education; law; pharmacy and health sciences; medicine; nursing; social work; fine, performing and communication arts; liberal arts; and the basic sciences. Every day, Wayne State graduates play a critical role in Michigan life, from local physicians to scientists and engineers working in the latest high-tech spin-off companies.

Table 3 illustrates the University's fall 2016 enrollment by headcount and degrees awarded from July 1, 2015 to June 30, 2016. Note that the Library & Information Science program moved from the Graduate School in Spring/Summer 2009 and is now being reported separately. In addition, these Figures, and all subsequent Figures, exclude graduate medical education students.

Table 3: 2015-2016 Degrees Awarded and 2016 Enrollment by College

School or College	**2015-16Degrees Awarded**	**Fall 2016 Enrollment**
School of Business Admin.	737	3,644
College of Education	680	2,573
College of Engineering	777	3,798
College of Fine, Performing & Comm. Arts	426	1,989
Graduate School	0	35
Law School	149	440
Liberal Arts & Sciences	1,620	10,074
Library & Information Science	179	466
School of Medicine	364	1,644
College of Nursing	199	668
Pharmacy and Health Sciences	452	968
School of Social Work	502	1,027
TOTAL	**6,085**	**27,326**

Source: Office of Budget, Planning and Analysis

Projected Academic Programming Changes

Construction of the State supported Multidisciplinary Biomedical Research Building (MBRB) began during December 2012 and was completed on July 17, 2015. The renamed Integrative Biosciences Center (IBio) will strengthen the University's ability to conduct basic, clinical, and translational research focused on diseases and quality-of-life issues associated with health

disparities in urban areas, which the National Institute of Health identified as a key scientific need. IBio is essential in helping Wayne State bring additional research dollars to campus and providing students and research faculty with laboratories and the technology necessary for continued academic success and expanded scientific discovery.

The STEM Innovation Learning Center and the NSF grant project to increase the use of evidence-based teaching methods in foundational STEM courses will be transformational in terms of their contribution toward further improving the University's student enrollment, retention, time to degree, and graduation rates in STEM programs. The impact these two initiatives will have on job creation will be incredibly beneficial to Detroit's continued revitalization and the southeast Michigan economy.

The fact that the repurposed Science and Engineering Library is located adjacent to the A. Paul Schaap Chemistry Building, Science Hall, Biological Sciences, the Engineering complex, and Physics, which form the core of our non-medical research buildings, will provide our undergraduate STEM students with countless opportunities to engage and be involved with active research projects with principal investigators and research faculty. Undergraduate student involvement in active research is another effort that is central to the student success focus area of the University's mission and strategic plan. Creating greater opportunities for such involvement and incorporating exposure to entrepreneurial development is another strategic focus that will yield positive outcomes for our urban communities going foward.

With respect to the University's *FY16 5-Year Capital Outlay Plan*, several important projects have been advanced, including:

- Electrical Infrastructure Upgrades: Under Construction
- BioSci / Nutrition & Food Science Lab Renovations: Completed August 2016
- School of Social Work Relocation: Completed August 2016
- Scott Hall Lab Renovations: Completed April 2016
- Elliman Lab Renovations: Under Construction
- School of Business Administration: In Design
- Anthony Wayne Drive Undergraduate Student Housing: In Design
- Thompson House Adaptation for Student Housing: Under Construction

In addition to the STEM Innovation Learning Center, the following list summarizes the University's other major facility priorities during the next five years. The need and scope of these projects is provided in the Implementation Plan below.

- Forest Graduate Student Apartments: $12.5 million
- Scott Hall Laboratory Renovations: $75.0 million
- Life Science Building Renovation: $20.0 million
- Rackham Building Acquisition: $8.0 million
- Mackenzie House Adaptation for Student Housing: $2.5 million

- Manoogian Basement Classroom Renovations: $8.0 million
- DeRoy Reflecting Pool Restoration: $3.0 million
- Hilberry Gateway Phase I: $25.0 million
- BioEngineering Building Renovation and Expansion: $19.25 million
- Class Lab Back-fill Renovations for STEM and Research: $10.0 million
- State Hall Classroom Building Renovation: $20.0 million
- Student Innovation Center for Engineering: $10.0 million
- Law School Classroom Building Renovation: $10.0 million
- University Deferred Maintenance Program: $35.0 million
- Parking Structures and Related Improvements: $10.0 million
- Housing Facilities and Related Improvements: $5.0 million

Unique Characteristics of Wayne State's Academic Mission

Wayne State is one of the nation's pre-eminent public research universities in an urban setting. Through our multidisciplinary approach to research and education, and ongoing collaboration with government, industry and other institutions including our University Research Corridor partners – the University of Michigan and Michigan State University – Wayne State University and our research and technology park, TechTown, seek to expand knowledge, enhance economic growth and improve the quality of life in the city of Detroit, state of Michigan, and throughout the world.

Through our dedication and leadership, Wayne State University is a nationally recognized center of excellence in research. Our faculty are leading the nation in many key research areas, and their groundbreaking discoveries make a difference in the everyday lives of others around the corner and around the world. We strive to continue making an impact by our innovative research.

Wayne State University is home to the Integrative Biosciences Center (IBio), a $90 million facility dedicated to studying and eliminating the many health disparities that plague the city's residents. IBio is home to faculty with expertise in environmental sciences, bio and systems engineering, heart disease, diabetes, obesity, asthma and biobehavioral health.

The building, strategically positioned near TechTown, will move discoveries and technologies from the laboratory to the community, and will eventually house over 400 individuals within 200,000 square feet of lab and clinical space designed to foster a collaborative and flexible team science approach to research. These teams of researchers will create and share knowledge that contributes to improving the quality of life and eliminating the many health disparities that plague Detroit's residents and other communities around the world. All of the research teams will be working together toward discoveries that have a translational impact on the community. IBio was designed not only to give researchers world-class lab space but, more importantly, to engage broadly with communities through prevention, education, and partnering.

For decades, Wayne State has changed the face of modern medicine, with discoveries such as the invention of the world's first mechanical heart pump in 1952 – a development that made it possible to conduct lifesaving open heart surgery. Wayne State is also home to the only National Institutes of Health branch dedicated to the study of premature birth and infant mortality. Since locating to Detroit in 2000, the Perinatology Research Branch has produced lifesaving research and care for more than 20,000 at-risk mothers. The Barbara Ann Karmanos Cancer Institute at WSU is one of 69 National Cancer Institute-designated Cancer Centers in the United States. Karmanos is the only hospital in Michigan dedicated exclusively to fighting cancer. Caring for approximately 12,000 new patients annually and conducting more than 800 cancer-specific scientific investigation programs and clinical trials, the Karmanos Cancer Center is among the nation's best cancer centers. Karmanos offers access to more than 90 cancer treatments often not available elsewhere in Michigan.

But our expertise goes beyond medicine. Around the world, you'll find Wayne State faculty and students engaged in research in nearly every field. Our researchers are making discoveries in their urban environments that will affect diverse populations everywhere. Our Institute of Environmental Health Sciences is home to the Center for Urban Responses to Environmental Stressors, a NIH-funded center that uses state-of-the-art technologies to identify the central mechanisms that lead to environmentally-linked disease, a major problem throughout the world. Researchers in the College of Engineering and College of Liberal Arts and Sciences are expanding our knowledge solving complex water-related problems through collaboration on public health, water use, technological innovation, and public policy. Partners include governmental agencies, industry, and community groups. They work on projects focused on pollution monitoring and impacts, invasive species, watershed-related public policies, dams, sediments, drinking and recreational water, ecosystem health, and waterborne diseases.
Our faculty are working to find cures for major degenerative conditions such as retinitis pigmentosa. With the help of technology developed by a faculty member in our School of Medicine, we are leading the way to restoring vision in patients with this condition that causes severe vision loss and blindness through a $60 million acquisition of a Wayne State University startup, RetroSense Therapeutics LLC by Allergan plc, a leading global pharmaceutical company headquartered in Dublin, Ireland.

This important work and many more research accomplishments would not be possible without the valuable partnerships we have formed with universities, hospitals, businesses and organizations around the world. Collaboration is essential to innovation, and combining our expertise is critical to finding solutions that save lives and changing the world.

Examples of some of WSU's larger research projects funded in the past year include:

- A team of researchers led by Sylvie Naar, Ph.D., professor and division director of behavioral sciences in the Department of Family Medicine and Public Health Sciences at the Wayne State School of Medicine and associate director of the Pediatric Prevention Research Center, has been awarded funding as a part of the Adolescent Medicine Trials

Network for HIV/AIDS Interventions, a research network devoted to the health and well-being of adolescents and young adults with HIV or at risk for HIV infection. The Wayne State team has been awarded an anticipated total of $15.7 million dollars over five years from the National Institute of Child and Human Development of the National Institutes of Health, for the project, "Scale it Up."

- Wayne State University has received a $3.6 million grant from the National Institute on Aging of the National Institutes of Health for a project that will advance knowledge of brain aging, its relation to cognitive performance and the role of common vascular and metabolic risk factors in shaping the trajectories of aging. The funded project, "Neural Correlates and Modifiers of Cognitive Aging," extends the longitudinal study of healthy volunteers from the metro Detroit area. The principal investigator is, Naftali Raz, Ph.D., professor of psychology and director of the lifespan cognitive neuroscience program in the Institute of Gerontology at Wayne State University.

- Jeffrey Stanley, Ph.D., associate professor psychiatry and Vaibhav Diwadkar, Ph.D., professor of psychiatry, will lead a $3.2 million study funded by the National Institute of Mental Health of the National Institutes of Health, "Advancing innovative brain imaging to detect altered glutamate modulation and network dynamics in schizophrenia." The study is the first to combine functional MRI, or fMRI and complex analyses of brain imaging data with innovative measurement of the brain's functional neurochemistry using functional magnetic resonance spectroscopy, or fMRS.

- Richard Slatcher, Ph.D. associate professor of psychology, College of Liberal Arts and Sciences, received a $2.74 million grant from the National Heart, Lung, and Blood Institute of the National Institutes of Health for the program, "Asthma in the Lives of Families Today – ALOFT." The goal of the project is to identify the behavioral and biological pathways through which family social environments impact youth asthma, the most common cause of youth hospitalization in the U.S. other than infections. Because family environments are modifiable, they are important targets for prevention and positive health promotion in the U.S. Findings from the ALOFT study can inform family-based interventions to improve asthma management in youth, and can inform how to more accurately assess daily family interactions with new technology and biomarkers to better capture potential mechanisms of behavior change.

Wayne State University also allocates significant resources to a number of exemplary research institutes and centers. The following are centers and institutes that fall under the Division of Research:

- The Institute of Gerontology is dedicated to research in social and behavioral sciences and cognitive neuroscience on issues of aging and urban health. The institute prepares tomorrow's leaders in aging research, and connects with health care providers, seniors and their families to disseminate current knowledge and best practices in gerontology.

The Merrill Palmer Skillman Institute works to improve the development, health, and well-being of infants, children, youth, and their families across the lifespan, through research, education, and outreach. The institute conducts research focusing on urban populations at increased risk due to community, environmental, biomedical, psychosocial, and other challenges.

- The Institute of Environmental Health Sciences is a core of research scientists who use state-of-the-art technologies to identify the central mechanisms that lead to environmentally-linked disease. The institute aims to benefit human health through the prevention or early detection of environmentally-induced disease. The institute is home to the Center for Urban Responses to Environmental Stressors (CURES), an NIH-funded center where researchers and community partners work together to understand how human complex exposures to chemical and non-chemical stressors in the urban environment can influence the development of environmentally-linked disease.

- The Center for Molecular Medicine and Genetics focuses on increasing the understanding, diagnosis, treatment, and prevention of disease. The center's activities range from basic research to clinical genetics to translation from the lab to the bedside.

Other Initiatives Impacting Facilities Usage and Needs

As part of its mission to prepare students to excel on a campus with exceptional student life experiences, Wayne State has embarked on several initiatives that are impacting this 5-Year Capital Outlay Plan. 2020 Campus Master Plan and 2012 Update

The 2020 Campus Master Plan, which provided the framework for improving and expanding the physical facilities of Wayne State, grew out of a University strategic planning process that concluded in 2001. The 2020 Campus Master Plan has served as a flexible document, written to provide direction and accommodate unanticipated conditions. The 2020 plan produced a clear depiction of the limitations and opportunities for expanding the main campus. It placed the University's highest priority on facilities that support our academic and research mission and many of its high priority recommendations have since been implemented. During 2012, the Campus Master Plan was updated to incorporate the University's evolving priorities, and that effort has impacted and changed projects proposed in previous 5-Year Plans. Wayne State University's new project priorities are represented in the Projected Academic Programming Changes section above and are described in greater detail in the Implementation Plan of this document. For the fiscal year 2017 capital planning cycle, Wayne State University is submitting the STEM Innovation Learning Center as its top priority for State capital outlay funding consideration.

During the past two years President M. Roy Wilson, Vice President of Research, Steve Lanier; Vice President of Health Affairs, David Hefner; and Vice President for Finance and Business Operations, Bill Decatur have joined the University's executive leadership team. Since their arrival, the University has established new institutional priorities, and *Distinctively Wayne State*

University, Strategic Plan 2015 – 2019 has been published. Our vision, mission, and values have been updated, and the strategic focus areas of student success, teaching excellence, research, diversity and inclusion, entrpreneurship, community engagement, financial sustainability and operational excellence will drive all that we do. With this has come the realization that the University's Campus Master Plan needs to be renewed, accordingly. Many constituent groups from across the University will spend the next 12 to 18 months responding to goals, including but not limited to:

- creating a multi-year space allocation strategy founded on current space utilization and future need,
- conducting a physical condition assessment of our buildings and other real estate assets,
- updating our housing and retail development strategy,
- updating our parking and transportation plan,
- creating a fully integrated 10-year capital budget and resourcing plan.

We expect this effort will significantly inform the content of future Wayne State University Capital Outlay Plans and Project Requests for several years to come.

Housing Demand Market Study

The resurgence of Midtown and Downtown Detroit has greatly increased the number of Wayne State students seeking to live on or near campus. The academic year that began in the fall of 2016 brought with it the third consecutive year of a 100 percent occupancy rate within University provided student housing, and this year, we have a wait list of students seeking an on-campus residential experience. A recently completed housing demand study has concluded an immediate need to develop 400 more beds of apartment style housing on the main campus to support the demand of junior and senior students, and serious consideration is being given to advancing a P3 relationship that would provide additional housing options for graduate students within the University Village, located just south of the main campus. We are also investigating the adaptive reuse of two other buildings for housing. Each of these are now included in our 5-year plan.

P3 Development of Mixed-Use Housing / Hotel / Retail

The University's 2020 Campus Master Plan for the housing expansion included the goal to create Public – Private Partnerships (P3) that would result in new student housing solutions located on our real estate under long-term land leases, wherein the private partner provides the construction capital. During 2007, Wayne State completed its first such project on Woodward Avenue through a venture with Studio One LLC out of Grand Rapids, Michigan. The project produced a $25.0 million market rate apartment building that many of our students reside in. The University's administration has recently executed a relationship with another private developer to advance an $80.0 million project that includes market rate apartments, a hotel, and additional retail venues at the corner of Cass and Canfield on the south end of campus. We expect that many of our students, faculty, staff, and visitors will benefit from this project.

Pivotal Moments: Our Campaign for Wayne State University

On October 8, 2014, we formally launched the public phase of the University's second comprehensive capital campaign to fundraise $750 million by 2018, when our 150th anniversary is celebrated. Each of the University's thirteen colleges and schools have critical goals to achieve through Pivotal Moments, some of which benefit facilities. Specific projects represented in our FY17 Plan include the Hilberry Gateway Phase I, Law School Classroom Building Renovation, the College of Engineering Student Innovation Center, and the New School of Business Administration.

Wayne State University Research and Technology Park

TechTown is Detroit's business innovation hub. As the city's most established business accelerator and incubator, it provides a powerful connection to a broad network of resources, catalyzing entire communities of entrepreneurs best poised to energize the local economy.

TechTown is a 501(c)(3) nonprofit and is located within the Woodward Technology Corridor SmartZone, north of the University's main campus. It offers both tech and place-based economic development programs.

In the district, Wayne State students and faculty work alongside entrepreneurs at TechTown to refine new generations of tech businesses. TechTown not only contributes significantly to the University's research capital but also strengthens and diversifies the region's economy. The relationship with TechTown highlights one of Wayne State's greatest strengths, its ability to partner with industry and government for the good of the populations the University serves. TechTown fosters a community of engaged, connected, and better served entrepreneurs, who will accelerate the region's transition into an innovation-based economy.

Economic Development Impact of Current/Future Programs

As previously mentioned, Wayne State University's impact on Southeast Michigan is substantial, estimated by the Anderson Economic Group to be over $2.5 billion per year! The significant percentage of alumni who remain in the area after graduation contributes greatly to the region's well-being through their professional and personal accomplishments, community activities, and financial resources. Additionally, the University is the seventh largest employer in the City of Detroit with more than 8,500 full- and part-time faculty and staff.

In fiscal year 2016, Wayne State spent more than $574 million for compensation, wages, and fringe benefits. The University awarded more than $331 million in financial aid (federal, institutional, private, outside and state) to 26,915 undergraduate, graduate and professional students for FY16. Expenditures on equipment, supplies, maintenance, design services, and construction exceeded $133 million. Of the $133 million, 62 percent of the contracts were awarded to Michigan.

The University spent over $213.8 million in research and development during fiscal year 2015. In fiscal year 2015, 58 new patent applications were filed on technologies invented at Wayne State, and 27 total patents were issued. Furthermore, the university spent over $1.1 million to file and maintain all of its patent applications and issued patents, and received $695,000 in revenue from license and startup companies.

Through fiscal year 2015, the University's intellectual property portfolio contained over 500 technologies. Over 100 of those technologies were licensed, 23 to Michigan companies. The University has assisted in the start-up of more than 25 companies, most based in Michigan.

Wayne State is committed to establishing infrastructure that supports the creation of new companies and encouraging an entrepreneurial culture. The Innovation Warriors/Blackstone LaunchPad entrepreneurship program has create and sustain more than 150 student-led ventures since 2011, while the Goldman Sachs 10,000 Small Businesses program has graduated more than 200 second-stage small businesses. TechTown Detroit has served more than 1500 companies, which raised over $112 million in start-up capital, and contributed more than 1200 jobs to the local economy from 2007 to 2015.

Projects transforming the Wayne State neighborhood include:

- Since 2013, 170 new businesses have opened in Midtown and another 110 are in the pipeline, looking for new space.

- The Live Midtown incentive has attracted and retained 2,025 residents since 2011, with 571 WSU participants (531 rental, 36 purchase, 4 exterior improvements). WSU’s total disbursements were $1.6 million. Over the 5 year period, the program has leveraged $11.5 million in rental payments and $10.2 million in home purchases.
- Residential occupancy for rental housing has been at or above 98 percent for the last four years.
- More than $245.0 million has been invested in residential development in Midtown in recent years.

Wayne State is committed to being a catalyst for economic growth in the city of Detroit. Recent initiatives include:

- Announcement of a $80.0 million development with private developer Broder Sachse. The development will include 248 apartments, a hotel with 128 rooms, and 19,000 square feet of street level retail space.

- Contribution of $300,000 to the final phase of the Midtown Greenway Loop project, a two mile pedestrian and bicyclist pathway connecting key destinations in Midtown. The final phase of the Loop will be along Cass Avenue, from Canfield to Kirby, on Wayne State’s campus, and is now under construction.

- Investment of $3.0 million in the M-1 rail streetcar, currently under construction.

- Construction of $68.0 million development for the Wayne State University Physicians Group on 3750 Woodward Avenue.

- Completion of the $93.0 million IBio on Woodward Avenue has spurred significant private development interest in its immediate area. The University is actively negotiating the sale of property that may bring up to 100 additional residential units to this neighborhood just north of the main campus.

- Graduation of 7 cohorts (217 graduates) of the Goldman Sachs 10,000 Small Businesses program.

III. Staffing and Enrollment

Enrollment

Several initiatives during the past few years have contributed to an increase in applications, including enhancements to the Honors and scholarship programs, aggressive enrollment management efforts, opening the Welcome Center and three new residence halls, and expanding the Comerica Charitable Foundation Academic Success Center.

Referring to Figure 1 below, Fall 2016 enrollment is 27,362. This is 104 more students than Fall 2015, an increase of less than 1 percent. Undergraduate enrollment is down 389 students, 2 percent, while graduate and professional enrollment rose by 493 students, or 5 percent.

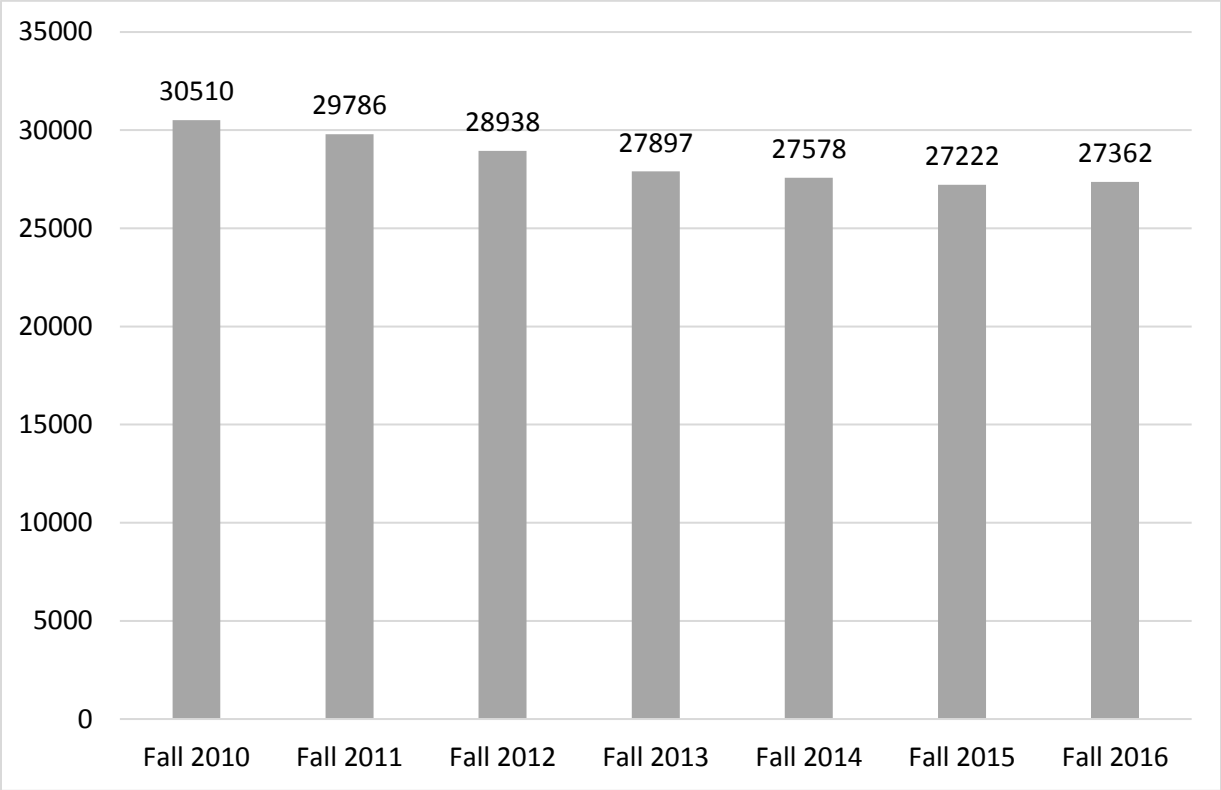
Enrollment of new freshmen increased by 26 students, 1 percent, and the returning freshmen retention rate decreased by 4 percent, compared to Fall 2015. New transfer and other new students increase by 68 students, 1 percent. Total undergraduate enrollment is 17,280.

New graduate students increased by 115, 6 percent, whereas new professional students decreased by 2 students.
Full-time undergraduate students increased by 1 percent, and part-time undergraduates decreased by 523 students, a 9 percent drop. Full-time graduate and professional enrollment increased by 164 students, or 3 percent. Part time graduate and professional enrollment also increased by 9 percent, or 329 students.
Total credit hours are 297,915, a 1 percent increase from Fall 2015. Undergraduate credit hours are down half a percent. While graduate and professional credit hours are up by 3 percent.

Michigan residents represent 88 percent of our student population, 3 percent are from other U.S. states, and 9 percent are international. The University has increased in the numbers of international students and the number of non-resident domestic students is about the same as last year. There are 930 students from other U.S. states and 2,407 international students.

Enrollment Patterns over the Past Six Years

Figure 1: Total Headcount Enrollment by Year



Source: Office of Budget, Planning and Analysis

In addition to courses held on the main campus in Detroit, Wayne State University offers instruction at six off-site locations in the tri-county area. In Fall 2016 we had 3,292 students enrolled in courses at the extension centers, a 32 percent increase from Fall 2015 (Table 4). A substantial number of these students are enrolled in classes on main campus as well. Distance-learning initiatives have been launched in the College of Education, College of Fine, Performing, and Communication Arts, College of Liberal Arts and Science, College of Nursing, Mike Ilitch School of Business, School of Library and Information Science, School of Medicine, School of Social Work, Eugene Applebaum College of Pharmacy and Health Sciences, and College of Engineering; the number of web-based classes, in which all or most of the coursework may be completed online, is consistently increasing (Table 5). The University offered 390 web-based sections in Fall 2016, up from the 343 sections offered in Fall 2015. Innovative course options, combined with campus residential choices, help position Wayne State as a desirable destination school.

Extension Center Summary & Web Class Report

Table 4: Extension Center 2015:2016 Comparison

	Section Count		Section Enrollment		Average Section Enrollment	
Class Section Enrollment	***2015***	***2016***	***2015***	***2016***	***2015***	***2016***
All Extension Centers TOTAL	217	210	3,343	3,292	15.4	15.7
Student Headcount and Credit Hours	**Headcount**		**Credit Hours**		**Average Credit Hours**	
Student Level	***2015***	***2016***	***2015***	***2016***	***2015***	***2016***
Undergraduate Totals	1,878	1,831	8,203	8,112	4.4	4.4
Graduate Totals	609	574	2,228	2,013	3.7	3.5
Professional Totals	0	1	0	3	0.0	3.0
TOTAL	2,487	2,406	10,431	10,128	4.2	4.2

Source: Office of Budget, Planning and Analysis

Table 5: Web Class 2015:2016 Comparision

	Section Count		Section Enrollment		Average Section Enrollment	
Class Section Enrollment	***2015***	***2016***	***2015***	***2016***	***2015***	***2016***
TOTAL	343	390	8,540	9,604	24.9	24.6
Student Headcount and Credit Hours	**Headcount**		**Credit Hours**		**Average Credit Hours**	
Student Level	***2015***	***2016***	***2015***	***2016***	***2015***	***2016***
Undergraduate Totals	4,394	4,578	18,296	19,620	4.2	4.3
Graduate Totals	1,768	2,188	7,937	9,440	4.5	4.3
Professional Totals	5	7	15	21	3.0	3.0
TOTAL	**6,167**	**6,773**	**26,248**	**29,081**	**4.3**	**4.3**

Source: Office of Budget, Planning and Analysis

Projected Enrollment over the Next Five Years

For Fall 2015, a slight overall decrease in student enrollment was reported. We did, however, have increases in the number of new FTIAC, new graduate, and new professional students, which projected a possible overall increase in enrollment. In Fall 2016, this projected increase was accurate. The overall student enrollment is up 1 percent from last year. Further, the six year graduation rate for full-time FTIACs has increased by 4 percentage points, to 39 percent. To continue this progress, Wayne State has committed to a concerted and coordinated effort to improve student success and learning, to increase retention and graduation rates, and to narrow achievement gaps. This initiative has 12 major thrusts, which are described here.
The first six thrusts were funded and initiated as part of the *WSU Retention Implementation Plan*, launched in 2012.

(1) **Undergraduate Academic Advising Initiative.** This initiative provided funding to hire 45 new professional academic advisors on campus, which allowed us to approximately double our institutional advising capacity and bring our student to advisor ratios into alignment with national best practices.

(2) **General Education Review.** The purpose of this initiative is to streamline, simplify, and better communicate general education requirements.

(3) **Support for Teaching and Learning**. In 2013, Wayne State University began to restructure and reinvigorate the Office for Teaching and Learning (OTL). An Associate Provost and Director, who has extensive experience and a national reputation for faculty and instructional development, was hired for the OTL. The staffing and resources of the Office for Teaching and Learning were increased to enable expansion of both services and impact.

(4) **Readiness for College.** Nationally, as access to college becomes a national priority, fewer students are coming to college ready to meet college readiness benchmarks and prepared for the rigor of a post-secondary education. Increasingly, remediating this gap is the challenge of colleges and universities who must simultaneously meet retention and graduation rate goals. This challenge has become particularly acute at Wayne State University, where we have enduringly had a mission of equal access and opportunity. To address this challenge, we have enhanced and expanded many of our support programs. In particular, the Academic Pathways to Excellence (APEX) Scholars program now offers a Summer Bridge Program that provides an opportunity for 132 students to earn up to eight college credits in a free, supported, and residential environment before joining Wayne State University in the fall, which increases their college readiness and gives them a head start on academic success.

(5) **Expanded First Year Experiences.** The transition into the first year of college is critically important to student success. In the form of learning communities, enhanced orientation programs, curriculum enhancements, and other forms of support, WSU has made investments into the first year experience for many years.

(6) **Expansion of Financial Aid.** For students in need of financial assistance, Wayne State University increased its financial aid by $6.2 million, or 11 percent for the 2013-2014 year. More than 80 percent of all Wayne State undergraduate students receive some form of need or merit-based financial aid. We are exploring and piloting various approaches to use financial aid to support degree attainment in more direct ways, while maintaining our mission of access.

(7) **GRAD: Greater Retention and Achievement through Diversity.** To build on our historical commitment to educational opportunity, WSU committed in July 2013 to launch the Greater Retention and Achievement through Diversity initiative, which aims to increase our retention and graduation rates for students of color and other underrepresented groups and to advance a mission of inclusive excellence. This strategic initiative led to the creation of a chief diversity officer position and an Office of Diversity and Inclusion. It also created a multicultural student success center as well as a campus diversity and culture study.

(8) **Big Data and Student Success.** WSU has embarked on a program to use "big data," analytics and machine learning to disclose patterns in data that influence desired outcomes. Early results have been interesting and are helping us discover student success factors that had not been considered before.

(9) **Community College/Transfer Student Initiative.** Various initiatives have successfully increased the number of students transferring to Wayne State University from community colleges.

(10) **High Impact Educational Experiences.** Wayne State University has made many investments in High Impact Educational Experiences – learning practices and environments that have been shown to be most effective in contributing to student engagement, motivation, deep learning, and long-term student success.

(11) **Pre-College Collaborative.** Wayne State University has more than 50 programs that provide educational experiences for pre-college students. These programs are delivered by a variety of units, schools and colleges, and programs throughout WSU. During 2013, the providers of these programs organized into a pre-college collaborative to share best practices and develop the capacity of these programs to support college access, readiness, and success within our local communities.

(12) **Strategic Graduation Action Project.** Direct intervention and other initiatives designed to help students graduate.

Student-to-Faculty Ratios

The published student to faculty ratio is based on full-time equivalent students (full time plus 1/3 part time) and full-time equivalent instructional faculty (full time plus 1/3 part time) and excluding students and faculty in stand-alone graduate programs. The Fall 2016 student to faculty ratio is 15 to 1, which is on par with the national average.*Current Class Size*

Class size varies depending on the program and class level. Lecture class sections average about 24 students. Subsections (e.g. labs and discussion groups) average about 14 students.

IV. Facilities Assessment

Functionality of Existing Structures and Space Allocations to Programs, Deferred Maintenance and Facilities Condition, Current Replacement Value

Wayne State owns and operates 106 buildings and leases space in another 24. The University delivers its programs from over 12 million gross square feet of space. Over the years, the University has used a number of methods to estimate and quantify its deferred maintenance backlog. Approximately 15 years ago, the University commissioned an evaluation of its major research buildings and programs to facilitate the development of capital investment and program expansion priorities. The study included detailed facility assessments for 16 research buildings. During 2002, the University conducted assessments of 12 non-research buildings, which concluded that the overall condition of several of these buildings is poor. In November 2009, another detailed facilities condition assessment was completed for 6 of the University's parking structures. The parking study was updated again this past summer. During 2012 a building condition assessment was conducted for all apartment and dormitory buildings. A follow-up study of DeRoy Apartments was completed in September 2015.

Beyond these building investigations, the University has commissioned single building studies that produced the Manoogian Building Condition Analysis and the Student Center Building Assessment of Existing Conditions, which led to completing major renovation projects in both buildings. The University also conducted studies on individual building systems that resulted in the Chiller Replacement Master Plan and the Roof Condition Report. Each of these studies helped establish capital outlay plans and a realistic estimate of the University's deferred maintenance backlog.

When Wayne State reported its current replacement value and deferred maintenance backlog, the aforementioned reports were used to define a baseline to which inflation assumptions were added over the years. Because most of the data was from studies conducted over a decade ago, the data accuracy came into question. During 2014, Turner Construction was retained to develop a new cost estimate for the current replacement value of each of our buildings using their extensive database of historical construction costs. Their analysis quantifies the University's current replacement value at approximately $2.7 billion just for the cost of construction. Adding 25 percent to this value for design fees, non-construction project scope and contingencies increases the value to approximately $3.4 billion.

A separate analysis this year of the University's actual capital construction investments since 1997 resulted in understanding that of our 85 general-fund buildings only 20 of them have received substantive renovations that would address deferred maintenance. Furthermore, the average age of the 85 general-fund buildings is 57 years, and most continue to operate with their

original mechanical, electrical, and plumbing infrastructures. Previous estimates of the deferred maintenance backlog were as high as $330 million. Recognizing the age of the portfolio and that 65 general-fund buildings have received little reinvestment other than operating funds, it would not be unreasonable to assume that the University's deferred maintenance backlog is much higher, perhaps exceeding $500 million. The scope of the 2025 Campus Master Plan noted above plans to include effort to quantify our deferred maintenance backlog.

Wayne State also conducted an electrical vulnerability study of its critical and sensitive building and scientific assets during 2012. This was done in response to the continuing unreliable public utility electrical infrastructure supporting the University from the former Detroit Public Lighting Department and Detroit Edison. Because significant power interruptions have been occurring with greater frequencies in recent years, occurrences that have resulted in two University shutdowns during the past five years, the University has been forced to install back-up power generation stations in several critical areas. During 2006, 4 stations were constructed to support research-intensive facilities, and in 2012, the University installed a new back-up generator station to fully support its main Data Center. The electrical vulnerability study resulted in a Board of Governors approval to invest an additional $12.1 million to upgrade electrical service entrances and substations, install additional back-up generators, and provide UPS equipment to protect sensitive scientific equipment. The implementation of this project is expected to finish this coming winter.

The University's infrastructure of parking structures and lots, roads, pedestrian walkways and site lighting continues to advance into a very good overall condition. From 2010 though 2016, the University has invested more than $20 million implementing major structural repairs and improvement projects to parking structures and several surface parking lots. During 2016 an additional $3.2 million was invested in the parking infrastructure. This *5-Year Capital Outlay Plan* includes $10 million to continue implementing improvements to this portion of the University's facility portfolio.

Strategic Energy Plan

As part of a 2008 environmental sustainability initiative, the University developed a Strategic Energy Plan which is based on three parts: energy procurement, energy production, and energy conservation. All natural gas is purchased through a consortium with the State of Michigan. Water and sewer services are purchased from the City of Detroit. On July 1, 2014, Detroit Edison acquired the assets and customer base of the former Detroit Public Lighting Department (PLD). Edison now supplies the University with all of its electricity. Terms of the Edison acquisition will have them constructing a new substation in the midtown area of Detroit and from it providing a new electrical service to each of the 43 former PLD serviced buildings. Edison's replacement infrastructure is now being designed. Implementation is expected to begin later this year and be completed by 2018. When completed, Wayne State expects most of its recurring electrical reliability problems to be issues of the past.
Since 2007, the University has self-generated nearly all of its steam used for heating and cooling. During 2012, the University executed contracts with Detroit Thermal to provide steam for the

Pharmacy Building and Scott Hall. Wayne State has always generated its own chilled water for comfort and process cooling. Because we do not have the land resources for a central heating and cooling plant, there are many small individual plants serving single or small groupings of buildings across campus. When individual plants require replacement or refurbishment, each is evaluated on a case by case basis to determine the most appropriate and economically justifiable approach for the future. Two such evaluations are now in progress for Physics and Biological Sciences.

With respect to energy consumption or conservation, the University has a long history of implementing many energy conservation measures. An emerging element of the energy plan is the retro-commissioning of existing buildings. Most retro-commissioning effort to-date has been focused on energy intense research and medical school buildings, where the greatest savings can be realized. Facilities Planning and Management has also organized an energy curtailment committee whose members have proposed and received funding to implement many energy conservation projects since its inception in 2012.

Facilities and Land Use

The overall distribution of academic and research space is expected to continue changing during the next several years. For example, when IBio opened last summer a larger percentage of the University's physical plant was dedicated to research. Academic and research uses make up the dominant share, now 4.5 million gross square feet. Included in this designation are classrooms, lecture halls, laboratories, and a significant portion of faculty and graduate student offices. While academic and research definitions may overlap, these two broad classifications are roughly equal in scope. Technology and distance learning will further redefine and shape future classroom space allocations and development.

Within the timeframe of the 2020 Campus Master Plan, which was completed in 2000, the University has developed additional space to expand many of its programs. Most of this additional space has or will be delivered to three major elements of the facilities portfolio: expanding on-campus residential opportunities, growing research and academic programs, and new parking structures.

The University has accomplished expansion primarily on land it owns. As this continues, the floor-area ratio is expected to increase to 1.60. Earlier land use evaluations concluded that a floor-area ratio of 2.0 to 2.25 was achievable and would not be detrimental to the campus or adjacent neighborhoods in terms of overall bulk or massing of the facilities. Planned development will preserve ample mall and green space for the community.

Building and Classroom Utilization Rates

To measure utilization of Wayne State University's existing facilities, the university utilizes Ad Astra Information Systems, which is a data software that more than 1,000 higher education institutions use. In conjunction with this software, the University of North Dakota's 2013

utilization report, *University of North Dakota: Space Utilization and Planning*, is used as an established benchmark to compare Wayne State University's space utilization efficiencies.

Since Fall 2014, Wayne State University has used Ad Astra more intensely to manage the 192 general purpose classroom spaces. Recently, WSU began using the software to auto assign rooms based off of departmental preferences and to set maximum capacities. This, along with working to move to a new scheduling matrix, will help remove potential barriers from students who need to graduate, and bring WSU to obtain higher classroom utilization.

Beginning Winter 2017, the Registrar's Office will shift focus from inputting data to reporting. A new scheduling matrix will allow the office to run utilization reports to determine how much improvement has been made in scheduling general purpose classrooms at WSU. The data will allow the Registrar's Office to offer suggestions to departments on increasing room utilization, thereby improving their programs. These reports will help departments better understand how to spread class offerings out over the entire scheduling week, reduce unused seats in rooms by scheduling classes into appropriately sized rooms, minimize class offerings that use non-standard meeting patterns, and reduce the offering of unnecessary sections.

The Registrar has pioneered the use of Ad Astra for general purpose classrooms, and other WSU schools, colleges, and divisions have begun migration of their departmentally assigned spaces to Ad Astra. Those schools, colleges, and divisions include the College of Engineering, School of Business, and University Libraries. The College of Pharmacy is scheduled to go live in Winter of 2017.

In 2013, the University of North Dakota (UND) comprehensively analyzed their utilization rates in their *University of North Dakota: Space Utilization Analysis and Planning* report. Similar to UND, Wayne State University offers courses from 8:00am through 10:00pm, Monday through Saturday. Known for being a university that caters to the nontraditional student, the majority take advantage of this schedule flexibility to allow them to have full-time or part-time jobs, to participate in internships, or to take care of family members and other personal commitments. Although the university does teach courses on Saturdays, these were not analyzed in order to keep some consistency with the UND benchmark, which analyzed course offerings Monday through Friday, from 8:00am to 4:00pm.

In applying the hourly and daily parameters of 8:00am to 10:00pm, Monday through Friday, a total of 75 hours per week in which classrooms, auditoriums, lecture halls, labs, computer labs, seminar rooms, and auditoriums could be scheduled for classroom use were analyzed. On average, actual classroom time is scheduled for about 26 hours of the 75 available, or 35 percent of the week. When an average 30 minutes of classroom prep time was added to this utilization, the rooms were used an average of 51 percent of the time available. In comparison, the University of North Dakota only analyzed their classroom data for a core 40 hours. Their utilization rates totaled 80 percent of the 40 hours available during the week, but the report notes that many institutions use a target of 40 percent and that reaching 80 percent is extremely difficult. In using the target of 40 percent, WSU is using their current classroom spaces well.

Further, the wide timeframe allows the university to continue to cater to the nontraditional student, but additional attention can now be provided to understand how this impacts the university's support services, such as audio-visual assistance, custodial maintenance, etc.

In addition, the rooms that are loaded into Ad Astra were also analyzed for their average seat fill rate. Wayne State's average seat fill for a 75 hour week is 70 percent. In comparison, the University of North Dakota only had an average seat fill of 65 percent for their 40 hour week. This shows that WSU students are taking advantage of the courses that are offered across campus, to the point that each class, on average, is at 70 percent capacity.

As stated previously, WSU continues to optimize Ad Astra in order to provide better data, create better efficiencies, and deliver the courses that students need. WSU is expected to increase utilization percentages as this technology is further taken advantage of, which will also allow support services to tailor their availability.

Mandatory Facilities Standards

As a "Carnegie Research University, Very High Activity" institution, Wayne State complies with required facilities standards.

- Animal research facilities are distributed throughout the main and medical campus buildings. Facility standards for laboratory research animals are rigorous and regulated by the national accrediting agency, the Assessment and Accrediting of Laboratory Animal Care.

- The University's offices of Environmental Health and Safety and Health Physics and Radiation Control are responsible for the collection, short-term storage and disposition of hazardous waste materials. These activities are regulated nationally by the Environmental Protection Agency, Nuclear Regulatory Commission, and locally by the State Department of Environmental Quality.

- Chemical and biological laboratories that contain fume hoods and store chemicals and/or reagents are spread throughout the main and medical campuses. These facilities are regulated by Occupational Safety and Health Administration standards (OSHA).

- Specialized facilities such as laser laboratories, large testing equipment and laboratories, and biohazard laboratories exist in the colleges of Liberal Arts and Sciences, Engineering, the Eugene Applebaum College of Pharmacy and Health Sciences, and the School of Medicine. These laboratories have special OSHA regulations and requirements and often need significant modification to the buildings and utility systems.

- The clinical behavioral science laboratories used for conducting research on human subjects are regulated by the National Institutes of Health. The University's Institutional Review Board is responsible for implementing these regulations.

Bond Status

The University has five building projects with obligations to the State Building Authority.

Building	**Lease Began**	**Lease Ends**
Old Main Renovation	November 1997	2032
Undergraduate Library	February 1998	2033
Pharmacy and Health Sciences	September 2002	2037
Welcome Center	December 2002	2037
Engineering Development Center	December 2009	2044
Multidisciplinary Biomedical Research Building	August 2015	2050

V. Implementation Plan

Throughout this document, Wayne State University has presented comprehensive information regarding its capital project plans. Consistent with our FY15, FY16, and FY17 Plan, this *5-Year Capital Outlay Plan* continues to present the STEM Innovation Learning Center as our number one priority State Capital Outlay Project Request for funding consideration. In addition to the STEM Innovation Learning Center, the University has in progress plans to advance several other capital projects as described below. As steps are taken during the next 12 months to move projects and fundraising efforts forward, current plans may be modified.

Planned SBA Funded Projects

STEM Innovation Learning Center ($29.5 million) is planned to renovate and repurpose the Science and Engineering Library into an enhanced instructional learning environment for undergraduate STEM students.

Status of Ongoing SBA Funded Projects

The Multidisciplinary Biomedical Research Building is the only active State supported project at Wayne State University at this time. Construction of the project is complete and limited FF&E items remain to be purchased and installed. Processing of all payment applications and invoices is in progress, and related State reimbursement will be completed as required by July 2017.

Non-State Capital Outlay Projects In Progress

Electrical Infrastructure Upgrades ($12.1 million) is under construction and will address various electrical vulnerabilities that were noted in the Facilities Assessment above. The project will provide emergency back-up generators to several key research buildings, UPS equipment to protect sensitive scientific instruments, and delay time re-start devices on freezer equipment. The project was approved by the University's Board of Governors on November 22, 2013.

Various Research Laboratory Renovations ($5.5 million) are under construction in Science Hall to support the Department of Nutrition and Food Science and in the Biological Sciences Building to support the Biological Sciences Department's research.

School of Social Work Relocation ($3.0 million), which involved renovating the recently acquired building from the Detroit Institute for Children located at 5447 Woodward Avenue and moving the University's School of Social Work, has completed construction and is in the process of completing payment applications and invoices.

Scott Hall Research Laboratory Renovations ($5.0 million) improved approximately 10,000 square feet of space on the fourth floor for cardiovascular programs within the School of Medicine. Project scope addressed HVAC equipment serving floors 5 through 9 also. Currently the project is finishing punchlist items and invoicing.

Elliman Research Building Renovation ($8.9 million) is renovating laboratories that will eventually be occupied by research faculty from the Karmanos Cancer Institute and others from the School of Medicine.

Mike Ilitch School of Business ($59.0 million) will construct approximately 120,000 gross square feet to replace the current use of Prentis Hall and the Rands House on the main campus. The project intends to develop a site off the main campus, in the downtown business district of Detroit. A substantial philontropic gift is the enabler of this project.

Detroit Edison Integration ($7.5 million) will provide new electrical services to all former Detroit Public Lighting buildings. This project provides the scope and necessary upgrades that DTE will not provide.

The Hilberry Gateway Phase 1 ($25.0 million) will provide new construction of a "Black-box" theater adjacent and connected to the existing Hilberry Theater. Once completed, a second phase project is planned to renovate the existing Hilberry and further expand the complex to permit consolidation of production support functions that are located in separate facilities. The project is currently in design.

Thompson House Adaptive Reuse for Housing ($5.0 million) will provide approximately 80 beds of additional housing capacity on Cass to help satisfy unmet demand. The project is currently out to bid.

Anthony Wayne Drive Undergraduate Student Housing ($40.0 million) will provide 400 new beds of on-campus apartment style options to satisfy growing and unmet demand.

Data Center ($13.0 million), which is currently in design, will provide approximately 10,000 square feet of current and best-practice environment to support the University's technology and services, offering flexibility for future growth.

Harwell Field Baseball Building ($1.7 million) will showcase a 2,000 square foot display room which will hold major league baseball artifacts and memorabilia collected by the Detroit Historical Society and Harwell Foundation. The building is currently under construction.

Planned Non-State Capital Outlay Projects

Prentis Façade Improvement and Interior Renovations ($3.0 million) is planned to provide necessary façade improvements. After the building is vacated to the new Mike Ilitch School of Business, interior renovations will commence to allow re-use of the facility.

Forest Graduate Student Apartments ($12.5 million) will provide 200 new beds of off-campus apartment style options to satisfy growing and unmet demand. This project will likely be delivered in a P3 relationship.

Scott Hall Laboratory Renovations ($75.0 million) will comprehensively renovate the 200,000 square foot research tower portion of the building for the School of Medicine.

Life Science Building Renovation ($40.0 million) will comprehensively renovate this College of Liberal Arts and Science research building.

Rackham Building Acquisition ($TBD million) is planned due to the expiration of our 25 year lease in 2019. The University's Communication Sciences and Disorders programs occupy Rackham.

Thompson House Adaptive Reuse for Housing ($5.0 million) will provide approximately 80 beds of additional housing capacity on Cass to help satisfy unmet demand.

Manoogian Classroom Renovations ($8.0 million) will renew approximately 30 general-purpose classrooms on the lower level.

BioEngineering Building Renovation and Expansion ($19.25 million) will provide 23,000 GSF of additional research space and renovate the existing building. Within the College of Engineering, the BioEngineering Department is targeted for significant student and research program growth and is expected to have very high interaction with initiatives formed from the new Multidisciplinary Biomedical Research Building.

Class Lab Back-fill Renovations for STEM and Research ($10.0 million) will renew existing teaching laboratories or convert them to new research space following the completion of the STEM Innovation Learning Center.

The State Hall Classroom Building Renovation ($20.0 million) will renew and upgrade the remainder of this building's aging infrastructure. Constructed in 1948, State Hall is a general purpose classroom building critical to delivering courses for almost every academic program. Recent upgrades have included replacement windows on the north and south sides of the building, the renovation of the fourth floor to return it to general purpose classroom use, and cosmetic improvements in the basement through third floor. Building improvements which still need to be addressed include replacement of the mechanical and electrical systems, ADA issues including elevator replacement, and the replacement of windows on the east and west facades.

Student Innovation Center for Engineering ($10.0 million) will showcase engineering competition teams such as Formula SAE and hybrid vehicle programs, and include space for design, testing, and fabrication.

Law School Classroom Building Renovation ($10.0 million) will complete a decade long quest to expand and renew the Law School complex. The scope will replace the tiered, stadium seating classrooms with flat and raised floor seating options, upgrade MEP systems, and introduce current educational technology.

University Deferred Maintenance Program ($35.0 million) is a campus-wide initiative and includes regular investments in deferred maintenance beyond the projects listed previously.

Parking Structure and Related Improvements ($10.0 million) will continue a multi-year initiative to structurally repair and upgrade various parking structures. The program also includes important surface parking lot improvements such as paving, site lighting, gate and control equipment, and surface water drainage systems.

Housing Facilities and Related Improvements ($5.0 million) will continue to address various needs including life safety systems, technology upgrades, building envelope repairs, kitchen and bathroom modernization, and mechanical and electrical systems.