September 15, 2020

NEW UNITS OF INSTRUCTION, PUBLIC SERVICE, AND RESEARCH AT PUBLIC UNIVERSITIES

Submitted for:	Action.
Summary:	This item requests approval of one degree program at one public university.
Action Requested:	That the Illinois Board of Higher Education approve the following:

University of Illinois at Chicago
- Bachelor of Science in Data Science in the Chicago Region

STATE OF ILLINOIS
BOARD OF HIGHER EDUCATION

NEW UNITS OF INSTRUCTION, PUBLIC SERVICE, AND RESEARCH AT PUBLIC UNIVERSITIES

By statute, the Illinois Board of Higher Education (IBHE) is responsible for approving new on-campus and off-campus units of instruction, organized research, and public service, and units of administration proposed by public university governing boards. The Board's approval criteria, defined in rules adopted for administering the statute, addresses university mission, academic control, faculty and staff, support services, financial resources, student demand, curriculum, statewide need, and congruence with Board policies and priorities. In addition to the approval criteria in rules, each new program was reviewed for its contributions to the goals of the *Illinois Public Agenda for College and Career Success,* which sets forth new priorities to guide Illinois higher education. Staff recommendations are based on analyses of application materials and responses to staff questions.

Executive Summary – Public Institutions

<u>University of Illinois at Chicago</u>

- Bachelor of Science in Data Science in the Chicago Region

The University of Illinois at Chicago (UIC or University) requests authorization to offer an interdisciplinary Bachelor of Science (BS) in Data Science in the Chicago Region. The proposed program will consist of 34 general education credit hours; 57 credit hours of core data-science-related courses from the Colleges of Business Administration, Engineering, and Liberal Arts and Sciences; and at least 13 credit hours from one of nine concentrations. The concentrations are Bioinformatics; Business Analytics; Computer Science; Data Processing, Science, and Engineering; Health Data Science; Industrial Engineering; Social Technology Studies; Statistics; and Urban Planning and Public Affairs. The BS in Data Science is designed for and prepares undergraduates who plan to pursue technical or professional careers or graduate study in data science. The pairing of the Bachelor of Science in Data Science with concentrations across the curriculum reflect the intrinsically multi- and interdisciplinary nature of data science and the variety of disciplines covered by UIC colleges and departments. There are policies in place to ensure faculty members possess the training, credentials, and qualifications to provide instruction in the proposed program. The University has sufficient library, technology, staff, and financial resources in place to support the program.

Approval request summary, including staff conclusion, follows in Attachment A.

The staff recommends adoption of the following resolutions:

The Illinois Board of Higher Education hereby grants to University of Illinois at Chicago authorization to grant the Bachelor of Science in Data Science in the Chicago Region, subject to the institution's implementation and maintenance of the conditions that were presented in its application and that form the basis upon which this authorization is granted.

University of Illinois at Chicago

Proposed Degree Title in the Region of Authorization: Bachelor of Science in Data Science in the Chicago Region

Projected Enrollments and Degrees:

| First Year Enrollment	Fifth Year Enrollment	Degrees Awarded Fifth Year
45	200	50

Background

The University of Illinois at Chicago (University or UIC) is seeking authorization to offer a Bachelor of Science (BS) in Data Science in the Chicago Region. This multi- and interdisciplinary program provides basic knowledge in the foundations of data science and will prepare students for careers or graduate study. The core coursework provides basic knowledge and skills for data science; as a result, graduates from this program will be well-positioned for employment in any data sector and especially skilled in their area of concentration. Graduates will also be ready for graduate or professional studies as research in business, engineering, science, and social science is fast evolving with the intensive and widespread development of methods based on data science in all domains. With foundational core courses from the Colleges of Business Administration, Engineering, and Liberal Arts and Sciences, and deeper and domain knowledge in the concentrations from several UIC colleges, the proposed degree will prepare students for research and employment in this fast evolving area in a large variety of applications. By agreement of the Colleges of Business Administration, Engineering, and Liberal Arts and Sciences, the degree will be housed in the Department of Computer Science, College of Engineering.

Institutional Data

1050.30(b)(1)(H): Success in student progression and graduation rates across all existing approved programs, and success rates in programs preparing students for certification and licensure, shall be consistent with expectations in higher education and the appropriate related field of study. At a minimum, the Board shall consider these factors based on results for similar institutions. (i) Graduation rates, certificate and degree completion rates, retention rates, and pass rates for licensure and certification aligned with thresholds set by State nor national regulatory bodies. (ii) The success rate shall be, at a minimum, higher than those of the lowest quartile of these measures for similar Illinois institutions defined as open versus competitive enrollment institutions and primarily associate versus primarily baccalaureate granting institutions. Exceptions may be made to the lowest quartile if an institution is above the national average for these measures using the same comparison categories of institutions.

This section includes information about institutional and student success measures for each institution seeking program approval. The institution's rates will be compared to Illinois institutions from within a select comparison group and against the national standards or averages. For a proposed undergraduate program, this section will include undergraduate graduation rates, first to second year retention rates, student loan default rates, and any applicable licensure passage rates. For a proposed graduate program, this section will primarily focus on student loan default data since this measure also includes graduate students in the calculation.

Undergraduate Graduation Rates and Retention

Academic Year 2017-18
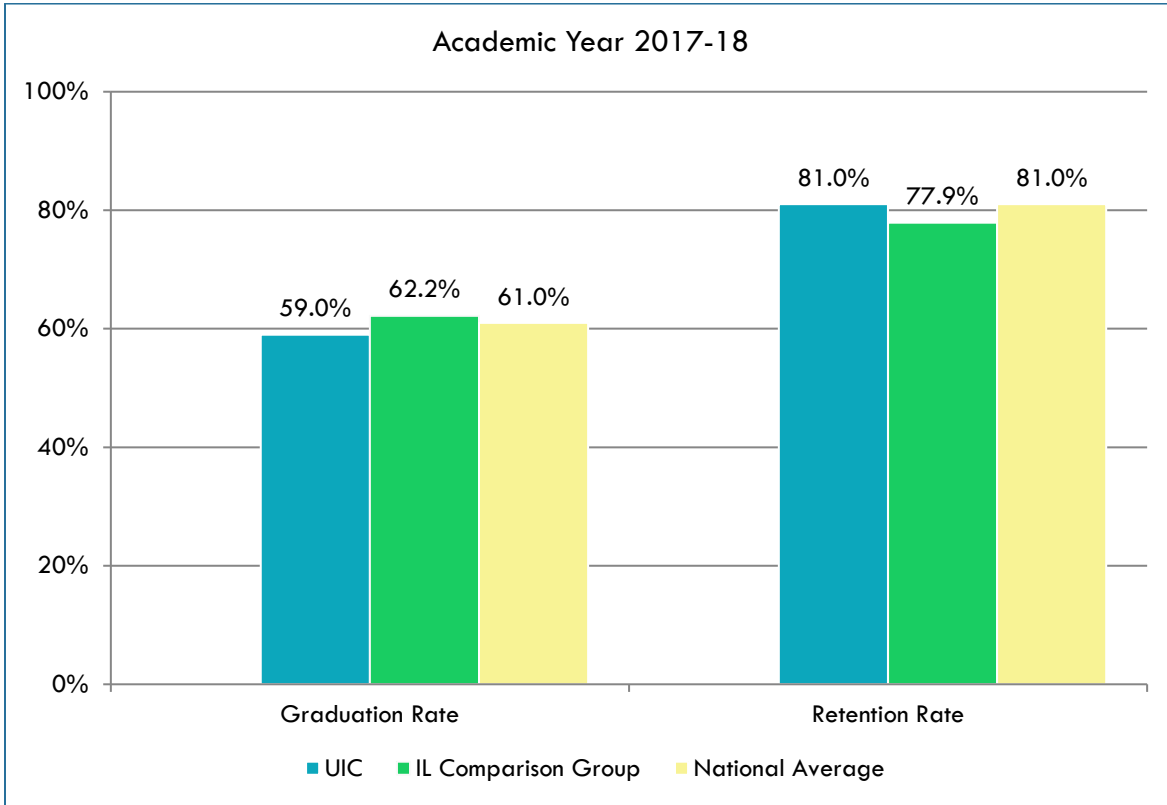
Source: National System for Education Statistics (NCES), US Department of Education
Note: University of Illinois at Chicago is in the four-year, selective Illinois comparison group.
Higher percentages are positive indicators.

Undergraduate Graduation Rate

The graduation rate measures the rate at which entering freshmen graduate within 150 percent of normal program length. Data are provided for six-year graduation rates for first-time, full-time bachelor's degree-seeking students and three-year graduation rates for full-time associate degree-seeking students. The national standard for graduation rates is reported annually by the National Center for Education Statistics (NCES).

Undergraduate Retention Rate

Retention rates examine the percentage of first-time degree seeking students enrolled in the fall of the prior year that are still enrolled in the fall of the current year. The national standard for retention rates is reported annually by NCES.

Undergraduate Completions per 100 FTE

Academic Year 2017-18	University of Illinois at Chicago	Comparable Illinois Institutions
	22	24.8

The full-time equivalent (FTE) data is a unit of measurement intended to represent one student enrolled full-time for one academic year. The calculation is based upon credit/contact

hours offered at an institution divided by a standard minimum (12 credit hour) full-time course load. The completions per 100 FTE data are included to provide a holistic view of completions across different student populations.

3-Year Cohort Student Loan Default Rate
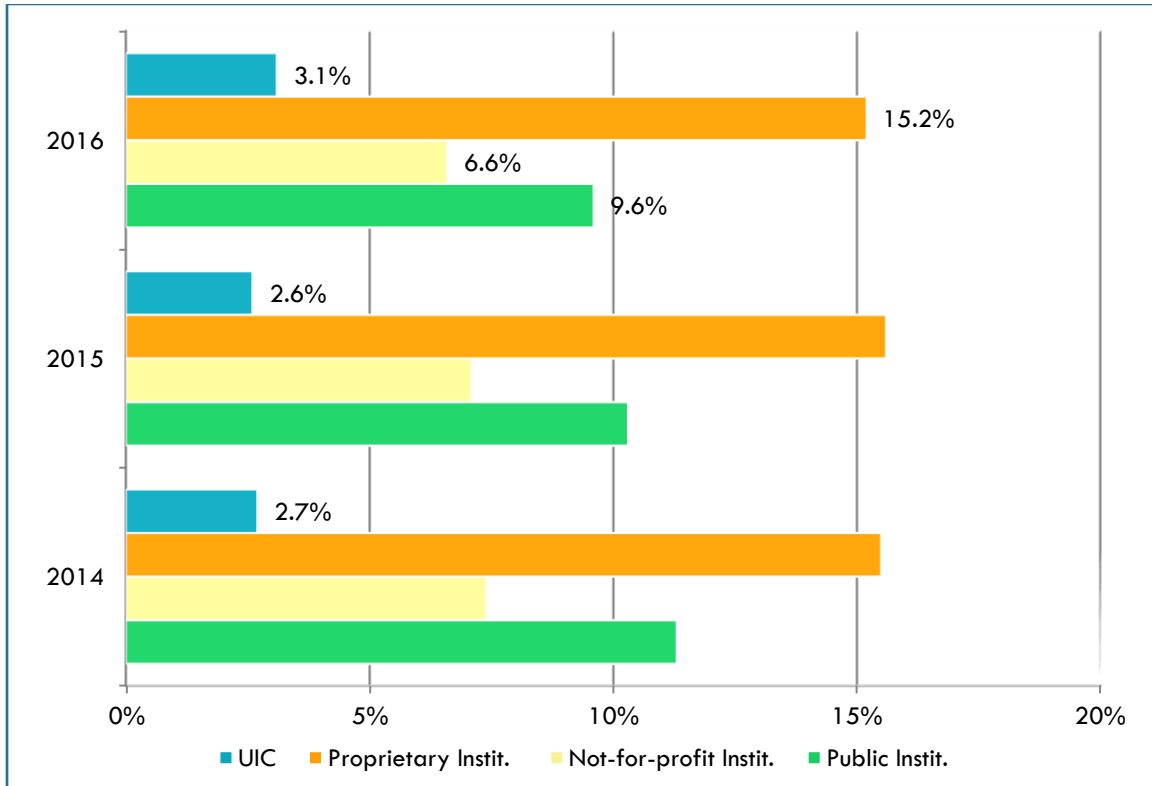
Source: National Center for Education Statistics (NCES), US Department of Education
Note: The national cohort default rate for fiscal year 2016 is 10.1%. A lower number is a positive indicator.

The three-year cohort student loan default rate is the percentage of a school's borrowers who enter repayment on certain Federal Family Education Loan Program or William D. Ford Federal Direct Loan Program loans during a particular federal fiscal year, October 1 to September 30, and default or meet other specified conditions prior to the end of the second following fiscal year.

Need

1050.30(a)(6): A) The unit of instruction, research or public service is educationally and economically consistent with the educational priorities and needs of the State of Illinois. B) The unit of instruction, research or public service meets a need that is not currently met by existing institutions and units of instruction, research or public service.

The U.S. Bureau of Labor Statistics (BLS) projects employment in relevant fields to grow much faster than the average for all occupations. From 2018 to 2028:

- Computer and information research scientists – 16%
- Statisticians – 31%

The U.S. Bureau for Labor Statistics does not yet break out the relatively new occupation of data scientist, but did publish a 2018 article about the spike in big data leading to very heavy

demand for relatively nearby job categories including statisticians and operations research analysts (https://www.bls.gov/opub/btn/volume-7/big-data-adds-up.htm).   Those two professions and also the additional near neighbor of data science, "software developers, applications" are on BLS's list of the fastest growing occupations and all had U.S. 2018 median annual wages of $80,000 to $105,000.

According to the BLS's Occupational Employment Statistics for 2018, Illinois ranked sixth in employment level for computer and math occupations, and Chicago-Naperville-Elgin ranked fifth among U.S. metropolitan areas for employment levels in those fields. The proposed BS in Data Science will enhance UIC's ability to provide relevant programs to frequently underserved students who are also underrepresented especially in the Computer Sciences. These facts create challenges and opportunities for the University to meet the needs of its largely commuter student population, provide appropriate student services and programs for those students, and create the Research I-level academic and scholarly research opportunities expected of the UIC. However, the proposed program addresses each of those challenges and opportunities.

The Illinois Public Agenda for College and Career Success

The proposed BS program supports Goal 1, Educational Attainment of the *Illinois Public Agenda* to "Increase educational attainment to match the best- performing states." Nationally, there is a dearth of women and underrepresented minorities pursuing higher education in computer science programs, where typical female enrollments are between ten and 20 percent and underrepresented minority enrollments less than five percent. Conversely, math and statistics bachelor's degree graduates have recently been over 40 percent female (https://www.aps.org/programs/education/statistics/womenmajors.cfm). Partnering with fields that consistently draw a more equitable balance of genders may encourage a wider population of students to pursue computer science training. Further, as a designated Hispanic Serving Institution (HIS) and an Asian American and Native American Pacific Islander-Serving Institution (AANAPII) by the U.S. Department of Education, the institution serves urban, working-class and multilingual immigrant populations by providing affordable access to a local Research I university.

The proposed Bachelor of Science in Data Science program also supports Goal 3, High Quality Credentials to Meet Economic Demand. Goal 3 seeks to increase the number of high-quality postsecondary credentials to meet the demands of the economy and an increasingly global society. Students with a strong computer science background are in high demand in graduate programs and professions worldwide. As well, students contemplating a career in private industry would gain valuable experience working on cutting-edge computational problems in areas where there is also significant demand, such as image processing and mining large data sets. Finally, as a result of growth in the region's tech industry and the location of major universities, students in the Chicago area may be particularly well-positioned to capitalize on new tech opportunities. Therefore, the proposed program contributes to meeting Goal 3 in culturally and economically relevant ways, given the diversity and need of UIC's larger community.

Comparable Programs in Illinois

Institution	University of Illinois at Urbana-Champaign	DePaul University	Roosevelt University
Program Name	Statistics and Computer Science	Data Science	Data Science
Sector	Public University	Private not-for-profit	Private not-for-profit

UIC's proposed program differs significantly from the University of Illinois at Urbana-Champaign's regarding targeted student demographics and a curriculum that includes a business perspective, as well as a concentration requirement.

UIC's HIS and NAPISII status and the primarily urban, working-class and local populations it serves, enables the institution to provide high quality higher education programs to its unique student population. Additionally, it caters primarily to local students, with nearly two-thirds of undergraduates coming from Cook County alone – at least half of whom commute to campus. Finally, demand for data scientists from industry is large. The proposed program will meet this need.

Mission and Objectives

1050.30(a)(1): A) The objectives of the unit of instruction, research or public service are consistent with the mission of the college or university. B) The objectives of the unit of instruction, research or public service are consistent with what the unit title implies.

The program is consistent with the purpose, goals, objectives, and mission of the University. The requested degree title reflects the programs objectives and curriculum.

Curriculum and Assessment

1050.30(b)(1) [applicable only to units of instruction]: A) The caliber and content of the curriculum must assure that the objectives of the unit of instruction will be achieved. B) The breadth and depth of the curriculum must be consistent with what the title of the unit of instruction implies. C) The admission and graduation requirements for the unit of instruction must be consistent with the stated objectives of the unit of instruction. D) Institutions must show the capacity to develop, deliver and support academic programs. Procedures and policies that will assure the effective design, conduct and evaluation of the degree programs under the academic control of the institution must be developed. Assessment plans must demonstrate that the institution has identified clear and appropriate program and student learning goals and has defined appropriate outcomes. Appropriate data must be collected and may be requested by the Board to show the level of student learning that has occurred as a result of participation in the institution's programs of study.

1050.30(a)(2): The design, conduct and evaluation of the unit of instruction, research or public service are under the direct and continuous control of the sponsoring institution's established processes for academic planning and quality maintenance.

Admission Requirements

Students interested in the program would apply to enter UIC as a pre-major in Data Science. In order to be considered for admission to Data Science, students must have:
- At least a C in
    - MATH 180: Calculus I
    - CS 111: Program Design I
- An average math/science GPA of a 2.50/4.0.

Students would become eligible for admission to a concentration only after completing the requirements established by the departments. Transfer students admitted to UIC with the requirements of MATH 180 and CS 111 already completed will have the same requirements for admission to the Data Science major and will be instructed to discuss their next coursework steps with an academic advisor at orientation.

Curriculum

The Bachelor of Science in Data Science is a 120-credit-hour curriculum that includes core and basic science coursework, a concentration, and electives.
- Calculus and other math coursework, Computer Science, Statistics, Communications, and Engineering – 57 credit hours;
- General Education coursework – 37 credit hours;
- Concentration – between 13 and 18 credit hours:
    - Bioinformatics;
    - Business Analytics;
    - Computer Science;
    - Data Processing, Science, and Engineering;
    - Health Data Science;
    - Industrial Engineering;
    - Social Technology Studies;
    - Statistics; and
    - Urban Planning and Public Affairs;
- Electives.

Assessment of Student Learning

The University of Illinois at Chicago has established processes to measure and analyze student learning outcomes data. Direct measures include projects, essays, tests, and homework. Assessment of the learning outcomes within each course takes place throughout each semester. Indirect measures of student learning outcomes include focus groups and surveys, graduation rates and average time to degree, job placement salary and other employment data, and student applications and acceptance rates.

Program Assessment

The proposed program will be administratively housed in the College of Engineering. Due to the multidisciplinary nature of the proposed program, the College of Engineering, College of Business and the College of Liberal Arts and Sciences will convene an annual cross-college council comprised of representation from all departments that have core courses and concentrations to

monitor the proposed program's performance, growth, and curricular quality. Data to aid program evaluation include direct and indirect measures of student performance data such as:

- retention rates and average time to degree;
- annual senior survey results;
- employment rates and salaries and comparisons to national averages;
- rates of employment in summer internships;
- rates of acceptance to graduate schools; student composition; and
- alumni surveys.

Each of the concentration departments will also participate in overall program assessment, as well as assessment of their respective portion of the program. Assessment of student outcomes is measured directly and indirectly using formative and summative measures within the courses and across the curriculum to assess learning inputs, learning processes, quality of delivery of the curriculum and the match between learning outcomes and student performance.

Facilities (space, equipment, instructional materials)

1050.30(a)(4): A) Facilities, equipment and instructional resources (e.g., laboratory supplies and equipment, instructional materials, computational equipment) necessary to support the high quality academic work in the unit of instruction, research or public service are available and maintained. B) Clinical sites necessary to meet the objectives of the unit of instruction, research or public service. C) Library holdings and acquisitions, owned or contracted for by the institution, that are necessary to support high quality instruction and scholarship in the unit of instruction, research and public service, are conveniently available and accessible, and can be maintained.

Existing facilities at the University are sufficient for implementing the proposed program. Classroom space and computer resources are sufficient for the program's needs. In 2022, the College of Engineering plans to open a new building to house the Department of Computer Science. The University possesses appropriate library resources, including textbook and journal holdings, to support teaching and scholarly work.

Faculty and Staff

1050.30(a)(3): A) The academic preparation and experience of faculty and staff ensure that the objectives of the unit of instruction, research or public service are met. B) The academic preparation and experience of faculty and staff, as evidenced by level of degrees held, professional experience in the field of study and demonstrated knowledge of the field, ensure that they are able to fulfill their academic responsibilities. At a minimum, faculty shall have a degree from an institution accredited by a U.S. Department of Education and/or Council for Higher Education Accreditation recognized accrediting body or a degree from another country evaluated for U.S. equivalency in the discipline they will teach or for which they will develop curricula at least one level above that of the courses being taught or developed. C) The involvement of faculty in the unit of instruction, research or public service is sufficient to cover the various fields of knowledge encompassed by the unit, to sustain scholarship appropriate to the unit, and to assure curricular continuity and consistency in student evaluation. E) Support personnel, including but not limited to counselors, administrators, clinical supervisors, and technical staff, that are directly assigned to the unit of instruction, research or public service, have the educational background and experience necessary to carry out their assigned responsibilities.

The University has identified institutional policies that ensure faculty and staff hired possess the training, credentials, and other related qualifications to provide instruction at the institution. Faculty teaching in the proposed program will have the appropriate qualifications. A formal faculty evaluation process is in place.

Fiscal and Personnel Resources

1050.30(a)(5): A) The financial commitments to support the unit of instruction, research or public service are sufficient to ensure that the faculty and staff and support services necessary to offer the unit of instruction, research or public service can be acquired and maintained. B) Projections of revenues necessary to support the unit of instruction, research or public service are based on supportable estimates of state appropriations, local tax support, student tuition and fees, private gifts, and/or governmental grants and contracts.

The University has adequate faculty, staff, and other instructional resources to administer the proposed program. Existing faculty in the Colleges of Business Administration, Engineering, and Liberal Arts and Sciences will teach the proposed curricula.

Accreditation and Licensure

1050.30(b)(3)[applicable only to units of instruction]: Appropriate steps shall be taken to assure that professional accreditation needed for licensure or entry into a profession as specified in the objectives of the unit of instruction is maintained or will be granted in a reasonable period of time.

No specialized accreditation is required.

Program Information

1050.30(b)(2)[applicable only to units of instruction]: A) The information which the institution provides for students and the public shall include the following: i) An accurate description of the unit of instruction, including its objectives, length, and residency requirements if any; ii) Schedule of tuition, fees, and all other charges and expenses necessary for completion of the unit of instruction, cancellation and refund policies; iii) Student rights and responsibilities; iv) A statement regarding the transferability of college credits, including the fact that the decision to accept transfer credits is determined by the receiving institutions; v) A statement as to how the institution will advise students on the nature of the transfer process, including the importance of consulting with institutions to which the student may seek to transfer; vi) Evidence of arrangements for the transfer of courses or credits or both to institutional counterparts, when these arrangements exist; these arrangements are also known as articulation agreements; vii) A statement of the institution's most recent graduation rates and the number of graduates and enrollments as provided by the institution to the Integrated Postsecondary Education Data System (IPEDS) and any submission of data to satisfy Board reporting requirements; and viii) Other material facts concerning the institution and the unit of instruction as are likely to affect the decision of the student to enroll. B) The information listed in subsection (b)(2)(A) shall be available to prospective students prior to enrollment and shall be included in the institution's catalog of programs.

Detailed information about the proposed program, including description of the admission policies, university policies, tuition, fees, and curriculum are provided in the proposal and will be published on the University's website.

Staff Conclusion

The staff concludes that the Bachelor of Data Science proposed by the University of Illinois at Chicago meets the criteria to implement the Board of Higher Education Act (110 ILCS 205/et.seq.) as set forth in 23 Illinois Administrative Code, Ch. II, Section 1050.30, and the Illinois Board of Higher Education policies pertaining to assessment and accreditation or licensure.