

Strategic Planning Report: Physical Sciences & Engineering

// April 15, 2019

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I ILLINOIS LIBRARY

**Students from
Departments
supported by the
PSED Libraries
received 50% of the
total PhDs Awarded
by the University in
2017-2018**

Introduction

The Physical Science and Engineering (PSED) libraries are comprised of three physical libraries: the Chemistry Library, the Grainger Engineering Library Information Center, and the Mathematics Library and three virtual libraries: the Physics Virtual Library, the Geology Virtual Library, and the Carle Illinois Virtual Library. Two former physical PSED libraries, the Physics Library and the Geology Library, were closed within the last 10 years and the collections merged into the Grainger Engineering Library.

The PSED libraries provide support for 30.5% of the total University faculty, 31.5% of all undergraduate students, and 34.9% of all University graduate students. Students supported by PSED libraries received 30.6% of all degrees in 2018 and a truly impressive 50% of all Doctoral degrees granted by the University in 2018. In addition, faculty and researchers supported by the PSED libraries generated 64.4% of all the Indirect Cost Recovery monies gathered by the campus and received 60.5% of all sponsored research funding. This is before the introduction of the engineering-based Carle Illinois College of Medicine. See the chart below:

NUMBER OF FACULTY SERVED												
	Campus Total 2018	COE Total	School of Chemical Sciences Total	Math Total	Geology Total	Astronomy	NCSA	Atmos Sciences	Statistics	Beckman Institute	Totals for PSED units	All PSED as Percentage of Campus Totals
Tenure System Faculty 2018	1880	407	47	68	13	10	0	12	16	0	573	30.48%
BUDGETS, ICR, AND GRANT MONIES												
	Campus Total	COE Total	School of Chemical Sciences Total	Math Total	Geology Total	Astronomy	NCSA	Atmos Sciences	Statistics	Beckman Institute	PSED Totals	All PSED as Percentage of Campus Total
ICR Generated (000)	138636	61505	9121	1134	698	487	8715	1510	316	5848	89334	64.44%
Principal Investigators	1655	435	55	53	13	10	37	15	14	10	642	38.79%
Sponsored Research (000)	462258	168518	23524	3134	1620	1434	58573	3364	1042	18267	279476	60.46%
ENROLLMENT AND DEGREES												
	Academic Units Campus Total	COE Total	School of Chemical Sciences Total	Math Total	Geology Total	Astronomy	NCSA	Atmos Sciences	Statistics	Beckman Institute	PSED Totals	All PSED as Percentage of Campus Total
Undergraduates	33673	7234	1211	1256	62	128		71	634		10596	31.47%
Graduate Students	14672	4229	388	203	35	30		46	186		5117	34.88%
Degrees Granted	13043	3191	425	395	29	21		35	288		4384	33.61%
Doctoral Degrees granted	824	281	71	34	3	3		8	12		412	50.00%
Total IUs Offered	1472086	303892	64746	78598	7425	8981		11213	36513		511368	34.74%

The research and instructional programs above are being supported primarily by 4.5 library faculty, with one additional position currently in the search phase. Given the instructional and research numbers quoted above, particularly the support for 50% of all awarded doctoral degrees in 2018, it is incumbent on the Library to insure that adequate staffing and resources are being made available.

Strengths

Collections:

Strong historical collections, particularly in research journals, conference proceedings, and monographs.

Strong and deep discipline-specific collections including in European and Slavic language pure and applied mathematics, mathematical physics, astronomy, solid state physics, electrical and computer engineering, chemistry, computer science, theoretical and applied mechanics, civil and environmental engineering, and mechanical science and engineering.

People:

PSED library faculty enjoy strong working relationships with the faculty in the subject areas we support. These relationships, in many cases, have been forged through collaborative projects and programs.

PSED library faculty have years of experience in physical science, engineering, and biomedical sciences librarianship and strong contacts with library colleagues all over the world.

PSED library faculty are widely published and are engaged in a number of research initiatives, including user behavior and usability studies, analysis of information discovery and delivery systems, data management, linked open data, annotation services, transaction log analysis, and immersive scholarship studies.

Spaces:

Since the opening of the Grainger Engineering Library Information Center (GELIL) and the remodeling of the Chemistry Library, the PSED libraries enjoy high quality spaces and flexibility for service initiatives.

Implementation of a variety of digital scholarship spaces with supporting services, including the CARE (Center for Academic Resources in Engineering), the CBTF (Computer-based Instructional Facility), the IDEA (Innovation, Discovery, DDesign, and Data) Laboratory, and the School of Chemical Sciences Conference Facility.

CARE Center program has established a peer tutoring service and additional programs to aid in student retention.

Services:

Strong graduate assistant training programs and the placement of many former GAs in science and engineering libraries and digital library programs across the world.

Highly developed liaison and instruction program, including orientation and instruction sessions for incoming graduate students in mathematics, electrical and computer engineering, computer science, mechanical engineering, materials science and engineering, civil engineering, and physics.

PSED libraries are engaged in several international programs and information support efforts, including the I2CNER (International Institute for Carbon Neutral Energy Research) headquartered at Kyushu University in Japan, and the Center for the Physics of the Living Cell.

The introduction of a robust data management service and support for research products that expedite the scholarly communication lifecycle.

The development of a research impact analysis and assessment service for assisting faculty and students in grant applications and scholarship.

Opportunities (and Challenges)

1-3 Years:

Maintaining collection budgets to adequately support the research and scholarship programs within the purview of the PSED libraries. As recently as two years ago, this was a major problem.

The Altgeld Hall renovation provides an opportunity to improve library spaces in that building so as to highlight and facilitate access to Math Library collections and services; challenge will be to work with faculty who rely on the Math Library to identify and prioritize enhancements and physical collection requirements so as to best meet needs, requirements and preferences

The GELIL needs to be strongly aligned with the spaces and services planned for the new Classroom Instructional Facility being built immediately to the west of the GELIL.

The PSED libraries will continue to grow the close working relationship with the Carle Illinois College of Medicine and investigate services and collaborations that enhance the CIMED educational program.

The IDEA Lab must continue to foster our relationship with the Medical Health Maker Lab group.

PSED libraries need to re-establish the close working relationship with the Siebel Center for Design. At one time the interim director of the SC4D was working in the IDEA Lab on several projects, including a design learning database comprised of people, courses, and places on campus that are connected with design learning. There is a need for providing better support for design thinking and learning activities.

Providing continued support for innovation, entrepreneurship, and digital scholarship on campus in terms of spaces and services. The IDEA Lab is particularly well situated for this, given its involvement in the Health Maker Lab, College of Engineering Technology Entrepreneur Center, the Carle Illinois College of Medicine, and various cross-disciplinary student entrepreneurial groups on campus.

Providing support for the Data Science Institute and data analytic programs in various departments and colleges.

3-7 Years:

The need to digitize and make available the unique collections resources, such as the engineering technical report collections.

Expand the Library's data management programs to become more involved with data management at all levels, including big data applications.

Continued development of enhanced information discovery and delivery services.

Support for Open Access scholarship in its various forms – Gold, Green, Hybrid, and Bronze.

Establishment of a close working relationship with the Discovery Partners Institute.

Providing enhanced productivity tools similar to the GRIPTs (Grainger Research and Information Productivity Tools) that have been developed for research groups and departments that better support knowledge creation activities at multiple levels.

Leveraging the Library's expertise in research impact metrics and visualizations into increased involvement at the campus level.

Aspirations

Provide improved collection development analytics and evidence-based collection development, particularly with the literature supporting the growing population of STEM researchers and students.

Establish publisher license agreements and vendor contracts that expand Gold open access publishing, including securing publication offsets and publish to read mechanisms to assist in the funding of open access publishing.

Provide improved facilities and service support for capstone classes.

Work closely with the Carle Illinois College of Medicine on their IDEA Project Course, Data Science Project Course, and the student Capstone experience, particularly on course content development and learning outcomes.

Establish a Center or Laboratory for the study of information discovery and delivery that incorporates AI and machine learning, usability studies, enhanced modes of search input and display, data science literacy, smart search assistance systems and instructional components, and the incorporation of open access mechanisms to disseminate information content. This center will also explore the role of information technologies in knowledge creation and management services.

Working with Library Advancement, increase gift-giving and endowment monies for digital scholarship services activities, including funds for enhanced spaces, additional equipment, and the provision of high-level information services.

Create virtual reality/augmented reality (VR/AR) testbeds and training areas, with supporting infrastructure. Work closely with CITL, Technology Services, and college and departmental units working on VR/AR applications and activities.

Become involved with the Smart Campus initiative on several levels, including providing custom information discovery and delivery tools that are integrated with other campus services.

Results

Scholarship, Discovery, and Innovation:

Provide technology-rich learning and instructional spaces in the Library that will support collaboration, innovation, entrepreneurship, immersive scholarship, and design learning.

Expand innovation spaces such as the IDEA Lab, Media Commons, and Scholarly Commons.

Increase the Library's involvement in the Health Maker Lab, the Technology Entrepreneur center, the Carle Illinois College of Medicine, the Siebel Center for Design, Illinois Program for Research in the Humanities, the SBSR, the Discovery Partners Institute, the Cancer Center of Illinois, and other cross-disciplinary groups on campus.

Establish a Center or Laboratory for the study of information discovery and delivery that incorporates AI and machine learning, usability studies, enhanced modes of search input and display, smart search assistance systems and instructional components, and the incorporation of open access mechanisms to disseminate information content. This center will also explore the role of information technologies in knowledge creation and management services.

Develop information discovery, content delivery, instruction, and research productivity tools that support interdisciplinary discovery, translational research, data literacy, and knowledge creation from the idea stage to publishing and dissemination.

Provide improved collection development analytics and evidence-based collection development.

Maintain core historical collections for disciplines that rely on these (e.g., mathematics)

Improve the visibility of our collections and the ease with which students and faculty can access collections in order to help users identify and select resources that will be most useful to particular information needs.

Establish publisher license agreements and vendor contracts that expand Gold open access publishing, including securing publication offsets for funding open access publishing.

Transformative Learning Experiences:

Establish a campus-wide tutoring and student support service, similar to CARE, to aid in student retention and improve the student experience.

Establish a data literacy program.

Expand the Library's role in supporting capstone classes and cross-disciplinary programs.

Provide services that support immersive scholarship activities, including high-definition visualization, data-intensive scholarship, VR/AR instruction and research, the application of data analytics, student computing testbeds and sandboxes, and digital scholarship activities.

Expand the Library's distance education instructional and learning spaces.

Societal Impact:

Provide open access publication mechanisms through our discovery services that increase access to research for the citizens of Illinois and the world. (Connected to the center for information discovery and delivery)

Increase the Library's capacity for entrepreneurial support and integrate the Library into the campus design learning network anchored by the Siebel Center for Design.

Continue the Library's role in supporting the clinical, curricula, and research aspects of the first engineering-based college of medicine (CIMED) and the campus Health Maker Lab.

The Library will play an important role in the smart campus and community, leveraging our expertise in information discovery, applications integration, and interface design and deployment.

Assist in translational research initiatives, international research projects, and entrepreneurial initiatives within the Carle Illinois College of Medicine, the Discovery Partners Institute, and the Siebel Center for Design.

Widely deploy the research impact and scholarly communication analysis tools that the Library has been developing.

Resources for Strategic Investment

Expand the Library's program in learning analytics and research impact metrics. Leverage the Library's expertise in these areas by applying these techniques at the campus level.

Increase fund-raising efforts and endowment monies for spaces, equipment, and expanded information services.

Establish a culture of assessment in the Library, with a focus on evidence-based librarianship.

Engage in planning synergies and interactions with the Campus Instructional facility (CIF) being built east of the Grainger Engineering Library.

Participate in the remodeling plans for the Main Library.

Appendix: Division Work Overview