



January 22, 2020

TO: The Board of Trustees of the University of Oregon

FR: Angela Wilhelms, Secretary

RE: Notice of Academic and Student Affairs Committee Meeting

The Academic and Student Affairs Committee of the Board of Trustees of the University of Oregon will hold a meeting on the date and at the location set forth below. Subjects of the meeting will include consideration of approval of undergraduate degree proposals in data science and bioengineering.

The meeting will occur as follows:

Monday, January 27, 2020, 2:00 PM PT
Johnson Hall Conference Room 105*

**This is a telephonic meeting of the committee; the location is provided to members of the public for purposes of observing the proceedings.*

Johnson Hall is located at 1098 East 13th Avenue, Eugene, Oregon. Sign language for the deaf or hard of hearing should be requested at least 48 hours in advance of the posted meeting time by contacting Jennifer LaBelle at (541) 346-3166 or emailing trustees@uoregon.edu. Please specify the sign language preference.

PUBLIC MEETING
Board of Trustees | Academic and Student Affairs Committee
January 27, 2020 | 2:00 PM
Johnson Hall Conference Room 105

Convene

- Call to order, roll call, verification of a quorum

1. New Undergraduate Degree Proposals (Actions): Patrick Phillips, Provost and Senior Vice President

1.1 Data Science

1.2 Bioengineering

Meeting Adjourns

Agenda Item #1

New Academic Programs

- Data Science (Action)
- Bioengineering (Action)

The materials contained herein—other than the summary of requested action and resolution—are the same as what was provided to the Academic and Student Affairs Committee for its December 9, 2019 meeting. No changes to the proposals resulted from the university-level processes that occurred after that meeting.

Two new undergraduate degree approvals are before the Board of Trustees' Academic and Student Affairs Committee. Board approval is required before new programs are submitted to the Higher Education Coordinating Commission (HECC), and the Board delegated its authority for such approvals to the ASAC.

The first is an undergraduate major in Data Science and the second is an undergraduate major in Bioengineering. The material provided is the same as that which the committee saw in December 2019 when these programs were presented as an informational item only. Since that meeting, requisite approvals have been received from university committees and the University Senate.

The below information for each proposed degree is provided by the department(s) and the Office of the Provost. More detailed information (e.g., associated coursework, exam schedules and degree obtainment progression timelines) is available upon request.

Included documents:

- Data Science program summary (page 2 of this summary)
- Bioengineering program summary (page 5 of this summary)
- Presentation slide decks from December 9, 2019 (following this summary)
 - Data Science
 - Bioengineering

Data Science: new degree proposal summary

1. Describe the purpose and relationship of the proposed program to the institution's mission and strategic plan.

The University of Oregon is a comprehensive public research university committed to exceptional teaching, discovery, and service. Because data science is a growing interdisciplinary field, a data science undergraduate degree program is essential to UO's mission and is part of a key presidential initiative. The collaborative nature of this degree builds upon UO strengths in interdisciplinary programs.

In 2017 President Schill created the UO Presidential Data Science Initiative to strengthen UO's ability to help solve some of the world's greatest research challenges through the use of data. During AY17-18 a visioning committee conducted an in-depth study of all aspects of such a program. In the discussions of undergraduate offerings in Data Science, there was general consensus that the most meaningful form of bachelor's degree for UO students would be one in which general principles were covered side-by-side with domain-specific applications of the general approaches; a heavy admixture of domain-specific considerations is fundamental.

The proposed program will deliver a strong data science curriculum, where quantitative data analytic skills are acquired side-by-side with application domain knowledge. Graduates will walk away with the skills they need to immediately enter the workforce, addressing the statewide economic need for data scientists. More broadly, this program will help to train a new generation of researchers and continue to enhance University of Oregon's role as a premier research university.

2. What evidence of need does the institution have for the program?

Experienced data scientists are a growing economic need. The January 2019 report from Indeed, one of the top job websites, showed a 29% increase in demand for data scientists year over year, and a 344% increase since 2013. Data from the technology job website Dice showed a 32% increase in data science job postings year over year. Dice also noted that the job postings are from companies in a wide variety of industries, not just technology – e.g., investment banking, insurance, healthcare. Indeed currently lists 89 open data science jobs in Oregon; if the current year-on-year growth rate continues, this means that there will be 317 open data science jobs on this date in 2024 when we produce our first group of graduates.

With so many different domains requiring data science expertise, the core + domain emphasis built into the proposed program will help students to develop the core quantitative skills and apply them immediately to their domain of interest. We expect graduates of this program to find quality jobs immediately after graduation, in the local area and throughout Oregon and the rest of the United States.

3. Are there similar programs in the state? If so, how does the proposed program supplement, complement, or collaborate with those programs?

Of the four major research universities in the state of Oregon (University of Oregon, Oregon Health and Sciences University, Portland State University, and Oregon State University), only Oregon State University

(OSU) is proposing an undergraduate program with a domain emphasis structure that may be comparable to UO's.

The OSU program in biological data science is a natural outgrowth of the Computational Genomics and Research Biotechnology (CGRB) program that has existed at OSU for many years, and with which there have been numerous connections with UO. The new OSU program focuses on biological data science and offers three options, including: computational biology, ecological and environmental informatics, and genomics. Each of these options are focused in the natural sciences. In contrast, the UO program currently being proposed has been designed to be inclusive of disciplines across the UO and currently includes domain emphases in the natural sciences (biology), social sciences (geography), humanities (linguistics), and from the Lundquist College of Business (accounting analytics and marketing analytics).

Because of the long standing relationship in areas of computational genomics and biological data science between UO and OSU, there is likely to be collaboration between the two data science programs. The two institutions have complementary strengths in the area of biological data science (e.g., increased model organism research occurring at UO and increased environmental life sciences interests at OSU). Importantly, research and educational collaborations in these areas have occurred to varying degrees over the past decade, providing support for the likelihood of success of such a joint program.

The two institutions are in conversation regarding at least coordinating degrees in biological data sciences, and possibly collaborating on a joint program in this area that provides significant mutual benefits to each institution. The impacts on OSU and UO are likely to be mutually beneficial.

The other two programs in Oregon are at Oregon Institute of Technology (OIT) (in development) and Pacific University. These are not structured to have a domain emphasis, and as such do not present a natural area for collaboration with UO.

4. What new resources will be needed initially and on a recurring basis to implement the program? How will the institution provide these resources? What efficiencies or revenue enhancements are achieved with this program, including consolidation or elimination of programs over time, if any?

The program will grow organically over time, with the goal of reaching full capacity ten years after launch. At maturity, we anticipate a program that will be comparable in size to a large department in the College of Arts and Sciences (CAS), such as Computer and Information Sciences (CIS). As such, in addition to core and associated faculty for teaching, we will require staff and personnel for office and undergraduate degree management, advising, graduate employees, and technology coordinators for assisting in computational laboratories of newly developed courses. See below tables for expected instructor and administrative need.

As our program grows, we will work with existing departments and programs to acquire partial FTE to support these efforts. In addition, we will require the services of an internship and capstone coordinator specifically to assist with the unique capstone aspect of our program and interactions with partners for the internships. This last component is strongly informed by our interactions with the Bioinformatics and Genomics Internship Program (BGMP) in the Knight Campus Internship Program (KCIP). During this period of growth, we will work with staff of the KCIP to provide shared services for the capstone and internship.

Growth will occur based upon student need, following the below tables. The administrative staff table includes full time equivalency (FTE) and grey cells signify 0.0 FTE. Note that the course creation NTTF position is intended to support teaching faculty over the first three years in the integrated development of new DSCI courses. We anticipate at the end of the three years, the necessary courses will be created and the need for this position will be complete. The instructor need table includes the number of courses that will need to be taught by TTF or NTTF each year, and grey cells signify no anticipated teaching load.

Administrative Staff	Year 1	Year 2	Year 3	Years 4 - 10
Program Director	.4	.3	.2	.1
Director UG Studies	.5	.5	.5	.5
UG Administrator	1.0	1.0	1.0	1.0
Department/Office Manager	.5	1.0	1.0	1.0
Course Creation NTTF	1.0	1.0	1.0	
Advisor		.5	1.0	1.0
Technology & Lab Preparator		.5	1.0	1.0
Capstone and Internship Coordinator			1.0	1.0

Course Title	Year 1	Year 2	Year 3	Years 4-5	Years 6-10
DSCI 101	1	1	2	2	3
DSCI 102	1	1	2	2	3
DSCI/Math 311			1	2	2
DSCI/Math 345			1	2	2
DSCI/CIS 372			1	2	2
DSCI XXX Ethics			1	2	2
DSCI 411 Capstone					
Total Instructor Units	2	2	8	12	14

Due to the UO's commitment to increasing IT infrastructure over the previous 5 years (particularly investments through Transform IT and the creation of Talapas and RACS) the overall computing infrastructure is largely in place to support our degree. We will require specialized local equipment, such as a laptop pool, an educational condo on Talapas, and support for the Jupyter collaborative coding environment.

There are two types of instructional spaces that will be needed, large classroom spaces for lecture (greater than 200 students), and smaller data science training spaces (approx. 24-30 students each). The collaborative rooms in the Price Science Library (B040 and B042) are exemplars for this second type of training space, but are unlikely to satisfy the needs of DSCI education because they are in high demand.

The opening of the KCASI will provide the possibility for sharing more of these types of rooms, the demand for these will also be high. New dry, computational spaces will need to be created to support our program at maturity.

Bioengineering: new degree proposal summary

1. Describe the purpose and relationship of the proposed program to the institution's mission and strategic plan.

A new Bioengineering Program will leverage the recent investments in research and intellectual capital gained from new faculty to engender an educational impact for the UO and the state of Oregon. This objective is highly aligned with the UO's mission to be "a comprehensive public research university committed to exceptional teaching, discovery, and service". The program will prepare students for success and professional advancement in a critical and fast-growing segment of Oregon's economy. The broad, interdisciplinary education will equip graduating students to participate across a wide range of specialties in the life sciences – e.g. medical devices, pharmaceuticals, imaging, clinical and academic research. The synergy of Knight Campus research and talent with the educational efforts of the proposed program will continue to elevate the UO, its students, and the state of Oregon.

2. What evidence of need does the institution have for the program?

Innovation in life sciences has become an important high-growth driver to Oregon's economy. A 2016 report commissioned by the Oregon Bioscience Association¹ found that in 2014 the bioscience industry contributed 14,000 jobs to Oregon, an increase of 68% from 2002. Furthermore, these jobs were high paying and diverse. The average annual wage of \$67,081 was well over Oregon's average of \$52,000² and women and minorities accounted for 47% and 22% of employment, respectively.

In addition to job creation, the industry was responsible for bringing nearly \$289 million in NIH funding to Oregon institutions in 2015 alone. Thus, while some in the state might raise concerns about potential redundancy across institutions, the state as a whole is best served by capitalizing upon the unique resources and pool of students available at each university to provide a well-educated workforce that will allow Oregon to operate at the forefront of this rapidly developing area of economic activity.

The Knight Campus is well positioned to harness this growth in life sciences. A strategic component of the Knight Campus vision is to catalyze entrepreneurship and foster the creation and development of new companies arising from university research. The Knight Campus aims to create a synergy of collaborations across multiple institutions throughout the state, establishing Oregon as a life sciences hub that bridges existing centers in the Seattle and Bay areas.

3. Are there similar programs in the state? If so, how does the proposed program supplement, complement, or collaborate with those programs?

Oregon State University offers BA, BS, HBA, and HBS degrees in bioengineering through their Chemical, Biological, and Environmental Engineering department.

¹ See <https://www.oregonbio.org/wp-content/uploads/2017/04/2016-Annual-Report.pdf>

² as reported by the US Bureau of Labor Statistics - May 2018

Portland State University offers a BSME (Bachelor of Science in Mechanical Engineering) degree. The Mechanical Engineering Department has a research focus in biomaterials. OHSU offers a PhD in biomedical engineering through their School of Medicine.

Plans for the new UO degree have been developed in direct communication with deans and provosts at OSU and PSU, as well as part of planned articulation agreements with OHSU. All agree that now is an opportune moment to grow strength in the area across the state, as each university has its own unique emphasis area within the broad field of bioengineering. Developing this degree at the University of Oregon is the first step of what is hoped to be a broader collaborative effort of multiple institutions across the state.

The Bioengineering Program at the University of Oregon is expected to contribute to statewide efforts to increase Oregon's capabilities in applied life sciences. The program has been developed with a focus on areas of bioengineering that are complementary to existing programs, rather than competitive and is therefore not expected to negatively impact other institution's programs.

4. What new resources will be needed initially and on a recurring basis to implement the program? How will the institution provide these resources? What efficiencies or revenue enhancements are achieved with this program, including consolidation or elimination of programs over time, if any?

The bioengineering degree is a key priority for the institution. The President and Provost have indicated a commitment to evaluate and identify resources to support the program. Because of the unique opportunity that this degree represents, the overall process departs slightly from the regular cycle. Key leadership and instructional roles involved in growing and sustaining the program will be partially filled by faculty that are part of current and future searches within the Knight Campus. Faculty lines within the Knight Campus are self-funded, thus, establishment of a core faculty for this program is somewhat independent of other university constraints that may or may not emerge over the next several years.

Initial Knight Campus faculty searches have been highly successful, resulting in three tenure track hires that will add to the scholarship and instructional capabilities of the Bioengineering Program. Dr. Tim Gardner (TT - associate professor), was previously a biology and biomedical engineering faculty member at Boston University. Dr. Keat Ghee Ong (TT – full professor), was previously a named faculty member and Associate Chair of the Biomedical Engineering department at Michigan Technological University. Dr. Marian Hettiaratchi (TT – Assistant), will join in January 2020. She is a bioengineer who recently completed a post-doctoral fellowship at the University of Toronto. Additional hiring is expected to continue at a rate of one to three tenure track faculty per year until approximately twelve faculty are in place. In addition to these TT faculty, as this process develops, NTF lecturers can fill any programmatic gaps that might exist during the hiring process.

The Bioengineering Program is in an unusual situation in that it needs to establish an academic program before the majority of its core TTF are appointed. Therefore, a task force has been established to lead the initiative until such time as faculty and supporting administration are in place. The task force members are:

- Robert Guldberg, Vice President and Robert and Leona DeArmond Executive Director for the Knight Campus
- Patrick Phillips, Provost and Senior Vice President, Professor of Biology
- Mike Hahn, Associate Professor of Human Physiology

- Jim Hutchison, Senior Associate Vice President and Lokey-Harrington Chair in the Department of Chemistry and Biochemistry
- Nathan Jacobs, Curriculum Director ProTem

As the program reaches full scale (7-10 years), we anticipate needing levels of administrative, GE, and NTTF staffing as is typical for programs/departments of similar size. The table below outlines the anticipated administrative and instructional needs at full scale.

Administrative Needs – Steady State	
FTE	Position
1.0	Business manager
1.0	Administrative assistant
1.0	Fiscal coordinator
2.0	Student program manager / advisor
1.0	Lab manager
2.0	Teaching lab preparator
Instructional Needs – Steady State	
36	Instructor Units (TTF or NTTF)
30-40	GE Terms

**Academic and Student Affairs Committee
Board of Trustees of the University of Oregon**

**Resolution: Program Approvals –
Undergraduate Majors in Data Science and Bioengineering**

Whereas, the University of Oregon (University) benefits from a cross-section of high quality, well-designed academic degree programs;

Whereas, the University wishes to offer a Bachelor’s Degree in Data Science and a Bachelor’s Degree in Bioengineering;

Whereas, these programs leverage existing institutional strengths and create expanded opportunities for undergraduate students;

Whereas, these programs create interdisciplinary synergies in fields with growing demand;

Whereas, these programs have been approved by the provost, relevant institutional units and committees, and the University Senate; and,

Whereas, Section 4.3 of the Policy on Retention and Delegation of Authority authorizes the Academic and Student Affairs Committee to approve new programs on behalf of the Board of Trustees.

Now, therefore, the Academic and Student Affairs Committee of the Board of Trustees of the University of Oregon hereby approves the new **Bachelor of Science Degree in Data Science and the new Bachelor of Science Degree in Bioengineering** as proposed in the provided documentation.

Moved: _____

Seconded: _____

Trustee	Vote
Ballmer	
Ford	
Hornecker	
McIntyre	
Schill	
Wilcox	
Wishnia	

Dated: _____

Recorded: _____

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Data Science Undergraduate Program

December 9, 2019

**Academic and Student Affairs Committee
UO Board of Trustees**

Degree pending UO Senate approval



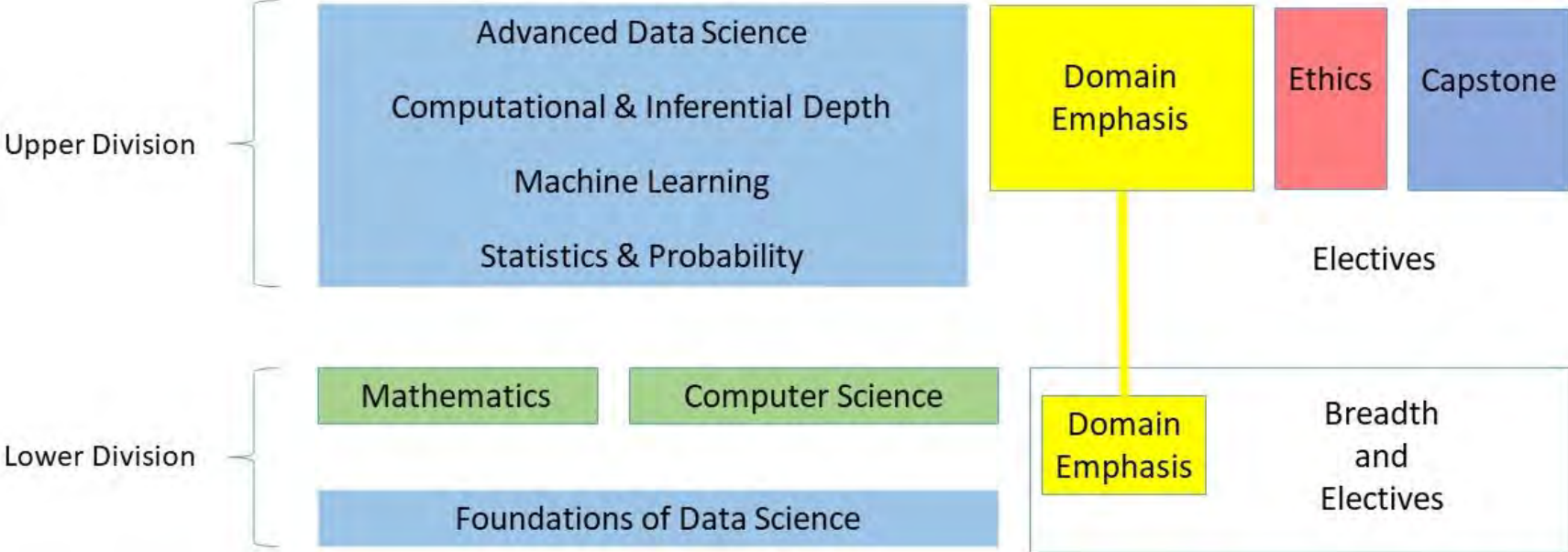
UNIVERSITY OF
OREGON

Data Science

Why University of Oregon?

- Data science programs have often grown out of technical programs or colleges
- UO's history has uniquely positioned us:
 - Long history of interdisciplinary research and liberal arts excellence
 - Data science domain applications across campus
 - Lack of schools of engineering, agriculture, and medicine
- We have designed a uniquely **university-wide** data science major:
 - Quantitative and computational depth
 - Broad domain application
 - Clear path for growth

Data Science General Course Outline



Need for the State and the Country

- Indeed.com shows a 29% increase in demand for data scientists year after year and Dice.com saw a 32% increase
- Today we see over 10,000 open data science jobs nationally
- In 2024 when our first cohort graduates, trends predict over 300 open data science jobs in Oregon
- We expect students to find quality jobs immediately after graduation – in Lane County, in Oregon, and across the US

What Will Students Do With This Degree?

- The core + domain emphasis built into the program helps students develop core skills and apply them immediately to their domain of interest
- Graduates will be able to immediately find jobs not only in technology, but in a wide variety of industries such as:
 - Investment banking & Insurance
 - Healthcare & Biotech
 - Government & Nonprofit
 - Automotive & Aerospace
- Students will be well prepared for advanced degrees that are increasingly requiring quantitative and computational skills

Who is Teaching?

Course Title	Year 1	Year 2	Year 3	Years 4-5	Years 6-10
DSCI 101	1	1	2	2	3
DSCI 102	1	1	2	2	3
DSCI/Math 311			1	2	2
DSCI/Math 345			1	2	2
DSCI/CIS 372			1	2	2
DSCI/PHIL DS Ethics			1	2	2
Total Instructor Units	2	2	8	12	14



How is it Being Administered?

Administrative Staff	Year 1	Year 2	Year 3	Years 4 - 10
Program Director	.4	.3	.2	.1
Director UG Studies	.5	.5	.5	.5
UG Administrator	1.0	1.0	1.0	1.0
Department/Office Manager	.5	1.0	1.0	1.0
Course Creation NTTF	1.0	1.0	1.0	
Advisor		.5	1.0	1.0
Technology & Lab Preparator		.5	1.0	1.0
Capstone and Internship Coordinator			1.0	1.0



What are the Infrastructure Needs?

Room Size by Seats	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
200+							3	3	3	3
100-199		2	2	4	3	6	3	3	11	11
25	5	10	19	29	39	52	62	69	75	75



Questions?



UNIVERSITY OF
OREGON

Data Science

UO Undergraduate Program in Bioengineering

Professor Jim Hutchison, Chemistry
Professor Mike Hahn, Human Physiology

December 9, 2019

UO Undergraduate Program in Bioengineering

Seeking approval* to establish new undergraduate degree program for launch in Fall 2021

- Institutional priority: Offer applied, engineering degrees
- Publicly supported by OSU: Home of the only other undergraduate Bioengineering program in the state
- High student demand for bioengineering
- High impact opportunity area for Oregon industry and the economy
- Wide benefit to other disciplinary programs across campus
- Complements proposed graduate programming in bioengineering and biomedical engineering

Board of Trustees' approval is not sought at this meeting. A formal request will come before the Academic and Student Affairs Committee only after all institutional authorizations have been completed.

Wide benefit to students, UO, Oregon and beyond

- Student access to applied science and engineering within a liberal arts environment
- New avenues for students to pursue degrees with significant societal impact

- Enhance strength of UO as a science university
 - Recruit **new** students bioengineering and STEM disciplines within CAS
- Additional students will take classes and support a wide range of disciplines across UO
- Establish a culture of innovation
 - Translate ideas to create impact and generate new IP

- Supports strong industry and job growth in the region and beyond
- Builds a stronger ecosystem for bioengineering across the state

A moment in time: An incredible opportunity

\$500 M investment in Knight Campus

- Facilities and equipment
- Recruitment of bioengineers to campus

+

Existing strengths in chemistry, biology, human physiology and business/innovation

+

Strong partnerships with OSU and OHSU to grow bioengineering and biomedical engineering strength in Oregon

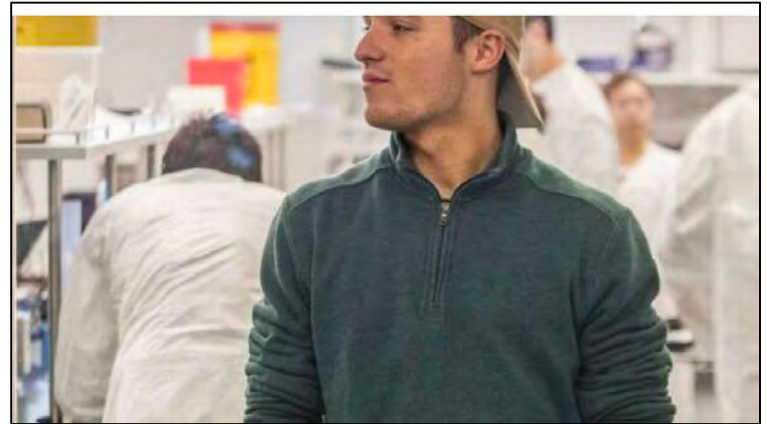
And a few challenges:

- No existing engineering infrastructure on campus (this is also an opportunity)
- Rapid timeframe – building capacity (faculty and space) and program in real time
- Academic home – incubating within CAS

Demand is high among students and industry

Nearly every bioengineering program on the west coast has had to cap their admission due to demand

- UW has ~200 UG students and admits only 25%
- UCLA (2018) 2,383 applicants, 281 admits, 68 enrolled



Students frustrated trying to get into UW's competitive engineering program *The Seattle Times* | February 24, 2017

Oregon Bioscience Association report (2016)

- Bioscience industry contributed 14,000 jobs to Oregon in 2014, up 73% from 2002
- Average annual wage of \$67,081 (vs. Oregon's average of \$52,000)
- Women and minorities accounted for 47% and 22% of employment, respectively

\$289 million in NIH funding to Oregon institutions in 2015 alone

Stronger together: Leveraging partnerships with OSU

Only existing undergraduate bioengineering program in Oregon is at OSU

We are partnering with them to build bioengineering strength in Oregon

OSU leadership is supportive of the proposed program



COMBINING STRENGTHS IN BIOENGINEERING

In Oregon, we're combining Oregon State University's legacy in engineering with the University of Oregon's infrastructure and facilities, highlighted by the \$1 billion Phil and Penny Knight Campus for Accelerating Scientific Impact, to leverage the resources of an entire state and region toward making a positive impact on society.

To learn more about Oregon's Combined Strengths, visit: engineering.oregonstate.edu/bioengineering/accelerate.uoregon.edu



ED/AR/JADA Institution committed to cultural diversity. ©2019 University of Oregon S10202019

OREGON BIOENGINEERING SYMPOSIUM 2019

Inaugural meeting covering all areas of bioengineering, with an emphasis on technologies for precision health

Friday, Nov. 22

9 a.m. to 6:30 p.m.
Oregon State University

Abstracts for oral and poster presentations should be submitted by Oct. 25. Undergraduate and graduate students are encouraged to submit poster abstracts.

Advance registration costs are \$25 (student/postdoc), \$60 (faculty), \$125 (nonacademic) through Nov. 8. Registration fees will be waived for the first 100 attendees to submit approved abstracts.

blogs.oregonstate.edu/bioengineering

Featured Speakers



Tim Gardner
University of Oregon
High Precision Interfaces to Brain and Nerve



Elaine Fu
Oregon State University
Porous Microfluidic Sensors for Field Use



Summer Gibbs
Oregon Health & Science University
Fluorescence Guided Surgery for Improved Clinical Outcomes



Matt Johnston
Oregon State University
Emerging Toolkit for Integrated Electronic Biosensors



Peter Jacobs
Oregon Health & Science University
Precision Drug Delivery through AI and Integrated Sensing



Mike Pluth
University of Oregon
Chemical Tools for Detection and Delivery of Reactive Sulfur Species



Financial opportunity: Program leverages Knight Campus resources and benefits the UO campus

- Bioengineering is a priority for the President and Provost.
- Leverage Knight Campus investment in bioengineering faculty who can contribute some of the required undergraduate instruction
- Will bring new students and tuition dollars to campus
- Over 60% of credits will be taken outside of bioengineering, driving resources to the rest of campus